Dyadic Interaction under Stress:

The Role of Adult Romantic Attachment

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by

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- Qu'est-ce que signifie « apprivoiser »?
-C'est une chose trop oubliée, dit le renard. Ça signifie « créer des liens... »
-Créer des liens ?
-Bien sûr, dit le renard. Tu n'es encore pour moi qu'un petit garçon tout semblable à cent mille petits garçons. Et je n'ai pas besoin de toi. Et tu n'a pas besoin de moi non plus. Je ne suis pour toi qu'un renard semblable à cent mille renards. Mais, si tu m'apprivoises, nous aurons besoin l'un de l'autre. Tu seras pour moi unique au monde. Je serai pour toi unique au monde...
-Je commence à comprendre, dit le petit prince.

(Antoine de Saint-Exupéry, Le petit prince)

To my nieces Charlyne & Lily and my nephews Jan & Tobias,
who were all born during the time this doctoral thesis was realized.

Abstract

In the context of an extradyadic stress, dyadic coping is an important resource to cope and it is known for its stress buffering effects. Relying on the partner as a safe haven when stressed is a characteristic of secure attachment. However, not all individuals seem to benefit equally from a partner's support. Insecure attachment has been thought to influence behavior and perceptions of dyadic coping and, as a result, to moderate the effects of support on well-being. The goal of the present study was to trigger dyadic coping behavior in couples in order to examine effects of attachment anxiety and avoidance on dyadic interaction and stress recovery. A total of 198 heterosexual couples were randomly assigned to three experimental conditions: 1) either the woman, 2) the man, 3) or each of the partners was stressed by means of the Trier Social Stress Test (TSST; Kirschbaum, Pirke, & Hellhammer, 1993), a highly standardized extradyadic stressor. Couples' interactions following the TSST were videotaped and subsequently coded, differentiating for stress communication (i.e., support seeking) and support providing behaviors. When only one partner was stressed, individuals recovered faster from stress the more positive support they received from their partner. In women, this positive effect of support was moderated by attachment anxiety. Furthermore, highly anxious women were characterized by superficial stress communication and poorer support providing quality. For men, on the other hand, higher attachment anxiety was related to increased emotion-focused support behavior, while higher attachment avoidance was related to decreased nonverbal and increased negative support behavior. When both partners were stressed, and thus simultaneously providing and seeking support, the effects of attachment were different. Based on the findings and presented concepts of stress, dyadic coping, and adult romantic attachment, a new model summarizing the impacts of partners' attachment on relationship quality as well as on partner's mental and physical health is outlined. The model offers indications for couple interventions, especially for the Three-phase-method by Bodenmann (2007, 2009; Bodenmann & Shantinath, 2004).

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INTRODUCTION

Close relationships are central to the lives of both adults and children. In particular, having someone answering responsively to one's needs or sharing life with a romantic partner is a central aspect of life for almost everyone. Research findings confirm that being in a satisfying close relationship is linked to health benefits. How is this possible when, being in a close relationship, an individual not only has to deal with his or her own stress, but can additionally become affected by stressors of the partner's environment and stressors originating within the dyad? A possible form for dealing with extradyadic stress is dyadic coping. There is growing evidence that this form of dealing with stress not only reduces stress experience but can help to improve or maintain a good relationship quality under stress.

However, not every individual seems to experience interpersonal interactions to the same positive extent. Insecure attachment is one possible personality factor which offers a framework to understand individual differences. Due to internalized negative experiences with caregivers, insecurely attached individuals tend to hyperactivate or deactivate the attachment system when stressed or perceiving a threat. Insecure attachment is, therefore, closely linked to interpersonal behavior and the perception of these interactions.

In the present doctoral thesis, theoretical concepts of stress, dyadic coping, and adult romantic attachment are first outlined before three empirical studies with couples are presented. The findings and theoretical implications are then summarized in a new model which has potential implications for couple interventions.

1. Stress and coping: An individual perspective

1.1 Lazarus's Transactional Model of Stress

Lazarus (Lazarus & Folkman, 1984) describes stress as a result of a transactional process between the individual and his or her environment. The interplay of perceived demands and available resources are at the center of the stress development process (see Figure 1). During a first appraisal, a current situation (or an upcoming event) is evaluated for its demands, controllability, and relevance for the individual. If the situation is evaluated as being neutral or even positive for one's well-being, there is no need for any effort to adapt to the new situation. A situation only becomes stress relevant if it is evaluated as having possible negative impacts on one's own well-being or being relevant to one's motives. The second appraisal, on the other hand, includes the evaluation of available resources to cope with the demands of the given situation. Resources can be external (e.g., having the money to afford a new car, or supportive family and friends) and internal in the form of physical health, personal characteristics (e.g., hardiness, self-esteem) or competences such as adaptive coping forms. An individual perceives stress when he or she evaluates that current demands (first appraisal) outweigh the available resources (second appraisal) in a particular situation; the demands are perceived to be overbalanced.

Lazarus (1991) further described different emotions as a result of distinct evaluations of demands during the first appraisal: Sadness is a result of perceived loss[1], fear a result of perceived threat, and anger a result of perceived provocation. When the situation is perceived as a challenge, stress can also result in positive feelings and activation. In this case the stressful event is perceived to be an opportunity to learn, as the appraised demands are merely negligibly larger or equal to appraised resources. This positive stress is also described as eustress, while all other negative stress states are described as distress (the words stress and

[1] Perceived loss can either be actual or evaluated as being possible in future (e.g., loss of self-image).

distress are used as synonyms in the following). The evaluation of a current situation as a threat, loss, provocation, or challenge not only results in different emotions but can also cause different physiological reactions. Fear as a result of perceived threat may "freeze" an individual's ability to react, while the perception of a challenge can mobilize additional energy to adapt to a new situation.

The first and second appraisals are not necessarily subsequent; they can occur simultaneously and unconsciously. The whole appraisal process is influenced by characteristics of the situation as well as the individual (e.g., current mood, personality traits, and previous experiences with similar situations). The magnitude of experienced stress may, therefore, alter in different situations (e.g., being alone in an unknown city may be more stressful than being in the same place with a friend), and, more importantly, differ between individuals, since experienced stress is dependent on one's cognitions.

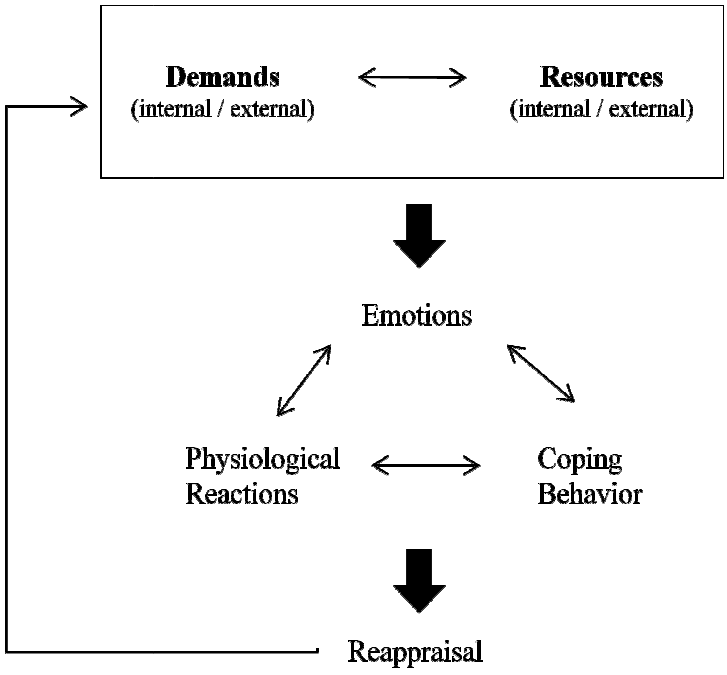

Figure 1: Schematic illustration of Lazarus's Transactional Model of Stress (Lazarus & Folkman, 1984)

According to Lazarus, the perception of stress does not represent a terminal state. A constant reappraisal process of demands and resources may alter the perception of a situation in its ambiguity and controllability (see Figure 1). Moreover, after first coping efforts, an individual may gain control over the situation, and what was initially perceived as a threat changes into a perceived challenge. Lazarus and colleagues (Lazarus & Folkman, 1984) described distinct forms of individual coping. Problem-focused coping is concentrated on altering the characteristics of a situation causing stress, while emotion-focused coping is concentrated on the regulation of emotions. All coping actions can include behavioral as well as cognitive efforts (e.g., reframing the situation) (Folkman, Lazarus, Gruen, & Delongis, 1986).

What is novel in Lazarus's Transactional Model is the centrality of cognitions; it offers a framework which explains why the same situation may cause different reactions and behaviors in different individuals[2]. In contrast to prior stress definitions, he did not concentrate on specific stressors (in contrast to Dohrenwend & Dohrenwend, 1974) or stereotype stress reactions (in contrast to Seyle, 1974). Depending on an individual's cognitions, perceived stress, and behavior may alter within a same situation. Stress is, therefore, a subjective experience.

1.2 Physiological stress response

The perception of a situation also has an impact on the magnitude of a physiological stress response. The rapid stress reaction through the autonomic nervous system (ANS) mobilizes energy for an optimal activation of the body by realizing epinephrine, also known as adrenalin, in the bloodstream. It is the sympathetic nervous system of the ANS that is

[2] With his model, Lazarus offered theoretical evidence to open the black box of, by this time predominant, behaviorists in order to understand an individual's behavior.

responsible for this activation, resulting in increased cardiovascular functions (accelerated heart rate, increased blood pressure, and sweating). This fast stress reaction is also described as the fight-or-flight reaction. The parasympathetic nervous system, conversely, is responsible for several vital functions such as digestion and regaining homeostasis. This system is suspended in times of stress.

The hypothalamic-pituitary-adrenal (HPA) axis of the endocrine system is also relevant for an efficient stress reaction beside the much faster stress response through the sympathetic nervous system. The end product of the HPA axis is the hormone cortisol. The release of corticotrophin-releasing-hormone (CRH) in the paraventricular nucleus of the hypothalamus stimulates the secretion of adrenocorticotropic hormone (ACTH) in the anterior pituitary into the blood stream, which in turn provokes the release of cortisol by the cortices of the adrenal gland. The distribution of cortisol in blood enables the body to react to stress efficiently. Natural levels of cortisol follow a circadian rhythm with the peak after wakening, then declining until the evening (de Kloet, Joels, & Holsboer, 2005; Gunnar & Quevedo, 2007).

A review by (Dickerson & Kemeny, 2004) revealed that uncontrollable situations combined with a psychosocial threat (i.e., social evaluation) provoke the highest HPA activation. An elevation of cortisol levels can be measured with a delay of 15-30 min in blood, urine, or saliva.

The adaptive stress reaction with increases in cortisol levels is gradually diminished by a negative feedback system, resulting in stress recovery. In healthy individuals, cortisol recovery is achieved within 60-90 min after a stressful event (de Kloet et al., 2005). According to McEwen (1998) chronic stress levels can impair this capability of the body to regain homeostasis—termed allostatic load—in four different ways: repeated hits as a result of frequent stress, lack of adaptation, prolonged response, and inadequate stress response. During recent years, the stress recovery process has attracted increased interest (Christenfeld,

Glynn, & Gerin, 2000; McEwen, 2000; Miller, Chen, & Zhou, 2007; Roy, Steptoe, & Kirschbaum, 1998). ACTH and cortisol levels are also linked to depression and other mental disorders (e.g., Heim & Nemeroff, 2001; Heim et al., 2002; McEwen, 2000).

2. Stress and coping: A dyadic perspective

2.1 Stress as a dyadic phenomenon

Although the model introduced by Lazarus and colleagues includes the social environment in the appraisal of external demands, it is concentrated on the individual. However, individuals are not independent of significant others, especially in the context of adult romantic relationships.

Bodenmann (1995b; 2005) formulated important enlargements of Lazarus's model for romantic relationships by taking a systemic perspective[3]. First, he described individual coping as only one possible coping form for romantic partners. Besides individual coping, dyadic coping (i.e., social support from the partner) is the most important source of support for most individuals (Bodenmann, 2005; Coyne & DeLongis, 1986). Bodenmann (2005) combined individual and dyadic coping with other sources of social support in the "stress-coping cascade" to offer a hierarchy and temporal framework of coping efforts. If an individual is stressed, he or she first tries to cope individually. When stress persists, dyadic coping is activated. Support from other social partners such as relatives or friends, only becomes relevant after seeking support from the partner and previous coping efforts have failed. The end of the coping cascade is represented by institutional support networks such as church organizations and, finally, professional services. The longer stress persists, the higher is the

[3] For an overview of other suggested models in the context of families and couples, such as the ABC-X model focusing on major stressors or the vulnerability stress model by Karney and Bradbury (1995), see Randall and Bodenmann (2009).

likelihood that a stressed individual considers less intimate support providers to increase available support. Even though this model presents temporal sequences, several coping efforts can also occur simultaneously (Bodenmann, 2005).

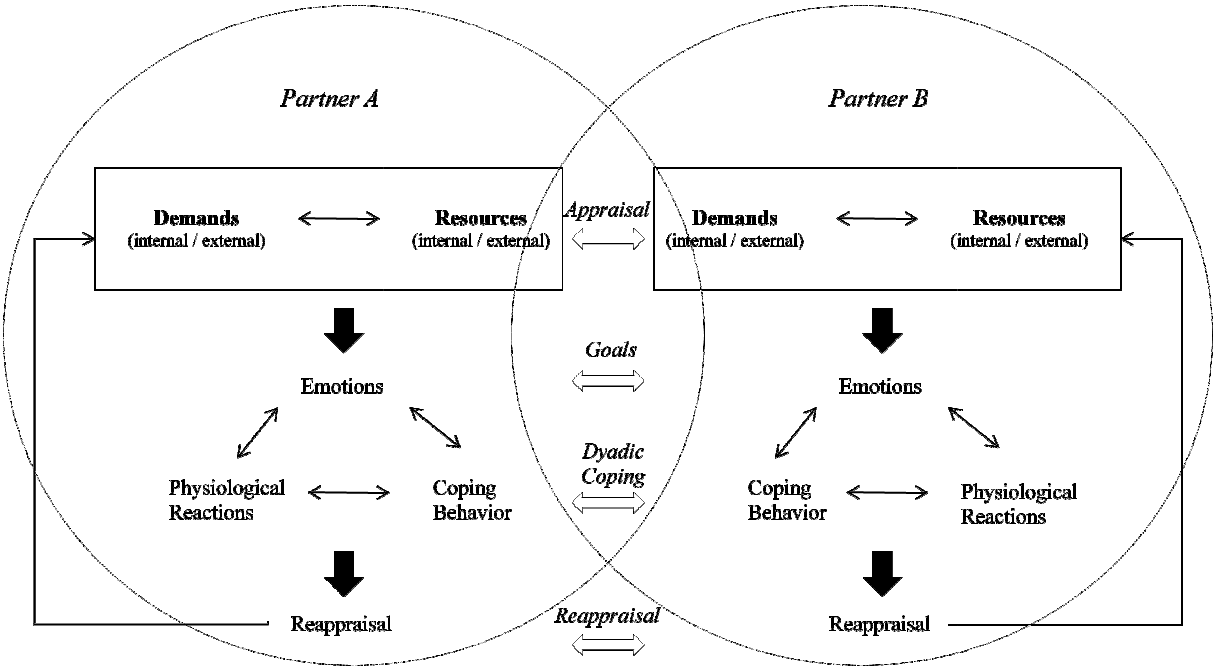

Figure 2: Schematic illustration of Bodenmann's (1995) systemic transactional conceptualization of stress and coping

Bodenmann (1995b) further reconceptualized Lazarus's Transactional Model of Stress by treating the couple—not the individual—as a unit. In his enlargement, a partner's stress appraisals, emotions, and coping behaviors are interrelated (see Figure 2). Within the first appraisal, demands are evaluated in terms of consequences for the individual's own well-being, the partner's well-being, and for the couple's well-being by combining (a) his or her own perception, (b) the partner's assumed perception (taking a meta perspective), (c) a verification that the partner is appraising one's situation, and (d) a final comparison of the partner's and his or her own appraisal in order to find a synthesis. Bodenmann (1995b) describes this synthesis process of each partner's perceptions to occur either in an open

discussion and problem-solving process, or without any discussion (as an internalized comparison between the individual's and partner's assumed perspectives). "Whose perception will be predominant may depend on factors such as dyadic power, self-esteem, or the knowledge where each partner is usually right in his or her perception." (Bodenmann, 1995b, p. 40). According to the appraisal of demands, resources are evaluated in terms of (a) one's own resources, (b) the partner's assumed evaluation of one's own resources, and (c) a comparison of the two perspectives. This secondary appraisal only becomes relevant if during the first appraisal a current situation has been perceived to affect one's own well-being, the well-being of the partner, or the well-being of the couple (according to Lazarus, positive or motive-irrelevant situations do not implicate an adaptation process). The evaluation of demands and resources are relevant for the unresolved individual stress of one partner affecting the other partner indirectly and dyadic stress originating from the dyad (e.g., discrepant goals of partners) or events affecting the couple as a unit, such as transition to parenthood, illness of one partner, or financial problems.

Central to an adequate coping process is the congruence of partners goals related to the couple or the individual. Additionally to each partner's individual coping possibilities, a couple has a common additional resource, dyadic coping. Just as individual coping does, dyadic coping includes problem-focused as well as emotion-focused aspects (see Chapter 2.2). The outcome of the coping process is again evaluated during reappraisal. In line with the first and second appraisals, this includes (a) the individual's own perception, (b) the partner's assumed perceptions and (c) a comparison of the two perspectives.

For individuals in a close relationship, the options for coping are, therefore, extended and the evaluation of a situation is enlarged by a second perspective, that of the partner. All this may produce a positive shift in stress appraisal processes, increasing the likelihood of perceiving a new situation as more controllable and less threatening.

2.2 The process of dyadic coping

Dyadic coping is conceptualized as a circular interpersonal process in which partner A communicates his or her stress, which is perceived and decoded by partner B and responded to by coping reactions (e.g., Badr & Acitelli, 2005; Bodenmann, 1995b; 2005; Cutrona, Russell, & Gardner, 2005). Figure 3 illustrates the dyadic coping process. Dyadic coping is not present, if (a) partner B would, as a result of partner A's stress communication, become stressed and respond with a stress communication him or herself, or (b) if partner B would not have perceived partner A's stress communication and, therefore, not react with coping (Bodenmann, 2005).

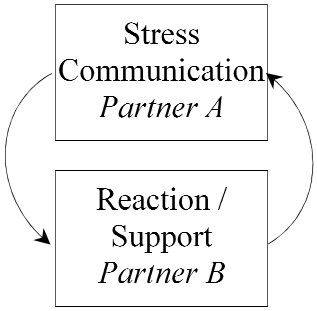

Figure 3: Components of the dyadic coping process (Bodenmann, 2005)

According to Bodenmann (1995b; 2005) dyadic coping (DC) can be categorized as follows. *Supportive DC* typically occurs when one partner is stressed and the other has the resources to provide support and help the stressed partner to adapt to the stressful situation. Coping reactions can have the function of solving a stressful situation (problem-focused supportive DC) by giving practical advice or by helping with seeking new information. Emotion-focused supportive DC, on the other hand, includes empathic understanding, helping with reframing the situation, showing solidarity with the partner, or encouraging the partner by showing belief in his or her competencies to master the situation. All these emotion-

focused coping reactions offer the stressed partner chances to calm down and underline the engagement of partner B by highlighting the sense of we-ness. Emotion-focused and problem-focused reactions can easily be combined in supportive DC.

In contrast to supportive DC, *common DC* appears when both partners are affected by the same stressor and have the goal of coping with that stressor as a team (e.g., illness of one partner, car crash where both partners are involved, child education, and financial problems). Problem-focused common DC includes joint information or solution seeking, joint planning, or problem-solving. Emotion-focused common DC, on the other hand, concentrates on calming activities, such as relaxing together, sexuality, or other joint activities to distract from the stressful situation by instilling a feeling of togetherness.

Supportive and common DC are most important and are interchangeable in different situations (one partner vs. both partners affected by the stress). *Delegated DC*, on the other hand, occurs only when one partner is stressed and he or she explicitly asks partner B to take tasks over. Instead of partner A, partner B takes the responsibility for a specific task or other problem-oriented coping activities (e.g., going to the grocery store, picking up the children, organizing a specific event), resulting in a new division of tasks.

Beside positive dyadic coping forms, negative dyadic coping forms cover all coping efforts that are not helpful to the partner (and may even become an additional source of stress). *Hostile DC* includes all hostile reactions to a partner's stress communication, such as criticizing or blaming the partner, denying or minimizing a partner's problem, making fun of a partner's feeling, diminishing a partner's experience, or ignoring a partner's stress communication (after having perceived the stress communication). Hostile verbal behavior of a partner is mostly accompanied by negative nonverbal and/or paraverbal behavior (e.g., sarcasm, withdrawal, exaggerated pronunciation, sneering, manipulating fingernails or other object). *Ambivalent negative DC*, on the other hand, is characterized by an unwillingness to

give support and/or to experience the act of support as stressful and unnecessary. The resulting superiority of the support provider by giving (ambivalent) support may be a consequence of asymmetry in providing support, especially when one partner more frequently assumes the role of support provider than the other. This lack of motivation to provide support is only perceivable on a subtle level, resulting in a delay in coping reactions or negative nonverbal behavior (e.g., incongruence in facial expression and verbal content of support). The third negative category of dyadic coping is *superficial DC*. It is characterized by a lack of empathy. Coping reactions are insincere, such as asking questions without listening to the answers of the partner or hugging the partner while thinking about something else. Both superficial DC and ambivalent DC can all be part of other forms of DC and are sometimes difficult to detect. In contrast to hostile support, they do not comprehend any negative verbal content, such as criticism or sarcasm.

Providing support is most effective when it fits the emotional needs of the stressed partner (e.g., Bodenmann, 2007; Cutrona, Shaffer, Wesner, & Gardner, 2007). Emotional stress communication should be answered by emotion-focused support instead of problem-focused support; the partner was perceived as being most sensitive in this case in a study by Cutrona et al. (2007). Problem-focused support is appropriate when the partner talks about his or her stress in a factual way or directly asks for advice or assistance. The effectiveness of problem-focused coping is also limited when the stressful situation has already passed and cannot be altered anymore. In this case, emotion-focused coping is central, especially reframing the situation when the stressed individual perceives that he or she has failed (cf. Lazarus & Folkman, 1984).

Furthermore, explicit emotion-focused stress communication (or deepened emotional self-disclosure) facilitates the partner's emotional understanding and allows him or her to provide support more adequately (Bodenmann, 2007). Stress communication is, therefore, crucial and

very important for adequate support, given that the partner is motivated and has the competences to provide support adequately. If stress communication includes only a neutral description of the stressful situation, where stress is, in the best case, latently perceivable or expressed nonverbally by sighing or shaking one's head (sad gesture), empathic understanding is harder to achieve for the partner. Implicit (e.g., "I feel like a fool"; "I was so nervous and stressed out") and, especially, explicit emotion-focused stress communication (e.g., "This made me angry"; "I felt ashamed and worthless"), where the partner clearly communicates his or her need of emotional support, are relevant for mutual understanding and intimacy. Emotion-focused stress communication is also used as a central concept in coping-oriented interventions with couples in prevention or therapeutic settings (see Bodenmann, 2007, 2009; Bodenmann & Shantinath, 2004; and Chapter 9.3).

The function of dyadic coping goes beyond social support from family, friends, or others. Partners in a romantic relationship are highly interdependent. Improving partner's well-being by helping him or her to reduce stress, is, therefore, closely linked to one's own well-being. Dyadic coping further enhances trust, intimacy, and the sense of we-ness. All these factors promote the distal goal of maintaining or improving relationship quality (Bodenmann, 1995b; 2005; Cutrona, 1996; Cutrona et al., 2005). This long-term effect of improving relationship quality was confirmed in several studies (e.g., Bodenmann & Cina, 2006; Bodenmann, Pihet, & Kayser, 2006; Pasch & Bradbury, 1998; Sullivan, Pasch, Johnson, & Bradbury, 2010). In relation to dyadic coping, other authors describe such coping efforts aiming to improve relationship quality as "relationship-focused coping" (Coyne & Smith, 1991) or "empathic coping" (DeLongis & O'Brien, 1990; O'Brien & DeLongis, 1996). Distinct approaches to dyadic coping concentrated on the dynamic of individual coping similarities or discrepancies between partners, instead of considering the couple as a system with common coping abilities (e.g., Barbarin, Hughes, & Chesler, 1985; Pakenham, 1998; Revenson, 1994). However, in a

current study by Bodenmann, Meuwly, and Kayser (in press), discrepant measures of individual coping were weaker predictors for relationship quality and individual health in comparison to dyadic coping.

2.3 The detrimental effect of extradyadic stress on close relationships

Even though positive effects of dyadic coping find growing evidence in research, it needs to be clarified why so many marriages end in divorce (or cohabiting partners separate). Bodenmann (2000, 2005; Randall & Bodenmann, 2009) summarized the destructive effect of chronic stress on close relationships in the following ways. First, stressed partners have less time to spend together as a couple. Second, chronic stress affects the physical and mental health of partners (see Chapter 1.2). And third, stress has negative effects on dyadic interaction. All these impacts reduce the likelihood of positive experiences, intimacy, and mutual exchange between partners, both from a quantitative (less time) and a qualitative point of view. Chronic stress levels, mostly unremarked, induce a process of mutual alienation, which gradually erodes marital satisfaction. This process is, according to Bodenmann (2000, 2005; Randall & Bodenmann, 2009), relevant for the increased risk of separation and divorce. Especially, chronic everyday stress (unresolved individual stress) has a destructive effect on relationship satisfaction and sexual satisfaction (e.g., Bodenmann, Atkins, Schaer, & Poffet, 2010; Bodenmann, Charvoz et al., 2007; Bodenmann & Cina, 2006; Bodenmann, Ledermann, & Bradbury, 2007; Neff & Karney, 2007).

A negative effect of extradyadic stress on dyadic interaction is present in an increasing body of studies; stressed individuals communicate less successfully, they become more withdrawn or irritable (e.g., Bolger, DeLongis, Kessler, & Wethington, 1989; Crouter, Perry-Jerkins, Huston, & Crawford, 1989; Repetti, 1989; Schulz, Cowan, Cowan, & Brennan, 2004;

Story & Repetti, 2006). In the study by Crouter et al. (1989), wives reported more negative marital interaction in the evening on days when husbands reported a higher workload. In Repetti's study (1989), male air traffic controllers and their wives reported more social withdrawal in dyadic interaction on days with higher workload for men. But when wives were more supportive, husbands expressed less anger. In a further study of dual-earner couples concentrating on gender differences, women reported being more angry and expressing more criticism on days with heavy workloads while men reported being more withdrawn (Schulz et al., 2004). In line with Schulz et al. (2004), Story and Repetti (2006) found a positive association for wives between high workload and the expression of marital anger and withdrawal. Additionally, both wives and husbands were more negative in their interactions on days with negative social interactions at work. They reported being more distracted and less responsive toward their spouses, indicating a spillover effect of mood. These stronger spillover effects for social stress at the workplace was also found in a study by Bolger et al. (1989), in which men's social stress at work – but not work overload – was associated with an increase in negative interaction with the spouse. They found no significant association for female social work stress.

All these studies provide evidence that stress originating from outside the relationship at the workplace (i.e., extradyadic stress) spills over to home by affecting interactions between partners and having the potential to trigger conflicts between partners (i.e., intradyadic stress). An unresolved individual stress for partner A can therefore also affect partner B by a reduced communication quality of partner A (this interdependence between partner A and partner B can also be described as a cross-over effect). However, all these studies were based on self-reports and are, therefore, only interpretable with caution. Only a few studies have used an

experimental approach and observed dyadic interaction[4]. Bodenmann and collaborators (Bodenmann & Perrez, 1992, 1995) designed a specific experimental approach for inducing stress in couples in order to examine its effect on dyadic interaction. During a "couple-intelligence test", couples had to work together in joint problem-solving under time pressure. Prior to the test, a first interaction aimed to give couples the opportunity to divide different tasks between partners and to observe baseline interaction. During the following "intelligence test", partners worked in different rooms and had to communicate through a specific interphone system, which was also part of the test. After a certain time, couples were interrupted and the test was terminated. The reason given to the participants was that one of the partners[5] made too many mistakes handling the interphone system. Couples where then reunited and observed during a second interaction. Comparing this second interaction under stress to the first interaction, the quality of observed behaviors decreased by about 40%, resulting from an increase in negative and a decrease in positive verbal behaviors (while the amount of positive nonverbal behavior increased). This association between perceived stress and communication quality was moderated by individual coping strategies. Partners reporting high functional individual coping strategies exhibited less decrease in communication quality than partners with low functional individual coping strategies (Bodenmann, Perrez, & Gottman, 1996). This finding underlines the importance of individual coping skills, beside or in combination with dyadic coping skills. Although partners have the opportunity to cope together as a couple, they should first try to cope individually to decrease the risk of a negative spillover to the relationship (see also Bodenmann & Cina, 2006). Therefore,

[4] Other experimental studies compared different support conditions in their effect on stress reactivity without considering the specific content of interaction (see Chapter 4.2/Study 1), concentrated on support seeking and giving process in the context of attachment (see Chapter 4.3/Study 2), or were based on support or conflict interactions without inducing stress (e.g., Ditzen et al., 2009; Fehm-Wolfsdorf, Groth, Kaiser, & Hahlweg, 1999; Powers, Pietromonaco, Gunlicks, & Sayer, 2006; Schaer, Ditzen, Heinrichs, & Bodenmann, 2007).

[5] Specific reasoning for the interruption of the test was randomized and varied in different studies (cf. Bodenmann & Perrez, 1992, 1995).

individual and dyadic coping competences may, reduce the detrimental effect of chronic stress on the relationship by decreasing the likelihood of a negative spillover and the risk of negative escalation (see also Bodenmann, Meuwly, Bradbury, Gmelch, & Ledermann, 2010).

Although, the experimental approach proposed by Bodenmann and collaborators (Bodenmann & Perrez, 1992, 1995) offered important findings, it had one weakness. By inducing possible anger towards the partner for being guilty for the advanced termination of the test, the effect of extradyadic and intradyadic stress on couples' interaction was mixed. It was, therefore, not possible to detect the specific effect of extradyadic stress. To better understand the effect of extradyadic stress on close relationships, it is crucial to examine different types of stress systematically (Karney, Story, & Bradbury, 2005; Randall & Bodenmann, 2009). Only if research clearly distinguishes between sources of stress (external vs. internal to the couple) is it possible to understand the underlying mechanisms of destructive effects of stress on close relationships.

Dyadic coping is especially important in the context of extradyadic stress when the partner himself or herself is not the source of stress. The partner may, therefore, be more motivated to provide support and be more empathic, since the origin of stress is independent from him or her (e.g., Bodenmann, 2005; Cutrona, 1996; Neff & Karney, 2004).

2.4 Stress, dyadic coping, and health

We have seen that, in the context of close relationships, stress is a dyadic phenomenon, and dyadic coping is a way to reduce stress spillover, thus improving or maintaining relationship quality in times of stress. This chapter provides a short overview of the health benefits of dyadic coping.

Support from the romantic partner is the major source of support for most individuals (Bodenmann, 2005; Coyne & DeLongis, 1986). A growing volume of research has provided evidence that being in a satisfying relationship and the associated positive dyadic coping processes are related to partners' mental and physical well-being (for reviews, see Bodenmann, 2000; Burman & Margolin, 1992; Cutrona, 1996; Proulx, Helms, & Buehler, 2007; Robles & Kiecolt-Glaser, 2003).

In a daily diary study by Dehle, Larsen, and Landers (2001), spouse support was associated with lower perceived stress and depressive symptomatology. Positive dyadic coping further reduced cancer-related distress in female breast cancer patients (Badr, Carmack, Kashy, Cristofanilli, & Revenson, 2010) and had positive effects in the context of other chronic illness (for a review, see Berg & Upchurch, 2007).

Previous experimental studies examining endocrine stress reactivity in the context of an extradyadic stressor have shown a stress buffering effect of partner support. Individuals who received support prior to stress induction had a decreased stress reactivity in cortisol compared to individuals who received no support or support from a friend (e.g., Ditzen et al., 2007; Kirschbaum, Klauer, Filipp, & Hellhammer, 1995). However, effects for women seem to be less clear than for men (see also Chapter 4.2/Study 1).

Overall, there is growing evidence that partners' cortisol levels are related to couples' interactions in everyday life (e.g., Ditzen, Hoppmann, & Klumb, 2008; Saxbe, Repetti, & Nishina, 2008; Slatcher, Robles, Repetti, & Fellows, 2010) as well as conflict interactions conducted in the laboratory (e.g., Ditzen et al., 2009; Fehm-Wolfsdorf et al., 1999; Powers et al., 2006), and that a positive relationship quality and social support have beneficial effects on cardiovascular, endocrine, and immune functions (for a review, see Robles & Kiecolt-Glaser, 2003; and Uchino, 2006).

Cutrona, Gardner, and Russell (2005) summarize the positive long-term effects of support on relationship quality and health in the Relationship Enhancement Model of Social Support (see Figure 4). The authors assume that increased trust is one of the underlying mediators for the association between perceived support and improvement of relationship quality and the resulting health benefits. Perceived support is dependent on a partner's attributions when evaluating the consistency of support. The attachment style is viewed as one critical personality factor (beside neuroticism) influencing attributions and perceptions of partner's support behavior in the development of trust. The concept of attachment will be presented in the following chapter.

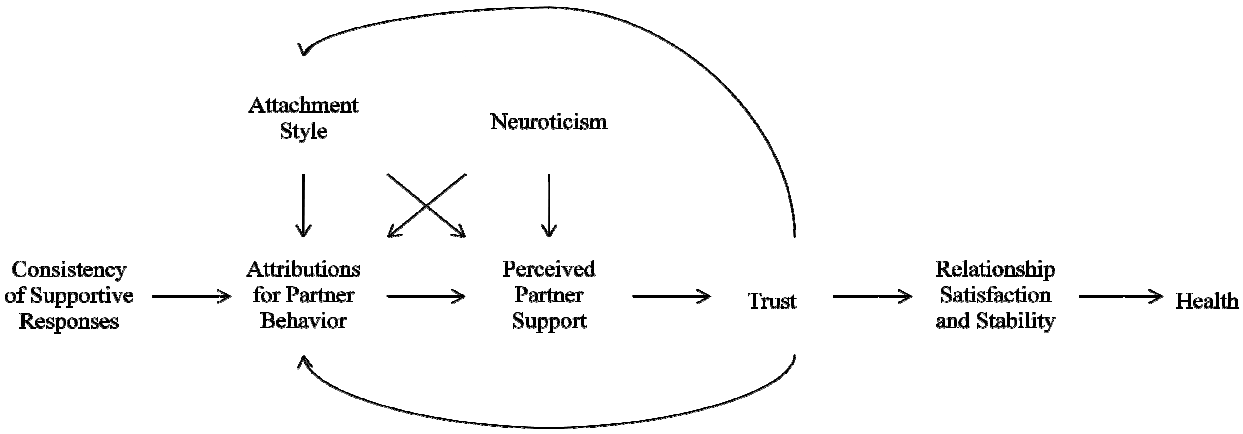

Figure 4: The Relationship Enhancement Model of Social Support (Cutrona et al., 2005, p. 74)

3. **Attachment**

3.1 Attachment and its origins in childhood

Bowlby (1969, 1973) included evolution-based and system-based approaches in his concept of attachment. He described the need of human as well as primate infants for a close bond to others. Maintaining proximity to the primary caregiver, usually the mother, serves to

feel secure. According to Bowlby (1969), an attachment bond has evolutionary advantages. Activating attachment behavior (e.g., crying, sucking, and smiling) in times of threat and danger, serves to guarantee the survival of the infant. Bowlby (1973) characterized an attachment relationship by: 1) maintaining proximity; 2) serving as a secure base for exploration, and 3) providing a secure haven to return in time of distress.

First experiences with primary caregivers, how they respond to one's needs in times of distress, are internalized and shape an "inner working model" of interpersonal relationships (Bowlby, 1973). The inner working model includes mental representations of the self and of others. Secure attachment is characterized by positive expectations and representations of the self as being worthy of love and others as a source of responsive support. Insecure attachment, on the other hand, is characterized by negative expectations about the self and care givers. Due to negative experiences in childhood, others are perceived as an unreliable source of support (Bowlby, 1973; Fraley & Shaver, 2000).

An important enlargement of Bowlby's clinically oriented approach was the work of Ainsworth, Blehar, Waters, and Wall (1978). Using the paradigm of the Strange Situation Test (Ainsworth & Wittig, 1969), they began classifying attachment behavior. 12-18 month-old children were observed in the lab while playing and exploring when the mother was present, and how they reacted when the mother left the room (i.e., separation distress). One aspect which was especially relevant for the attachment classification was the behavior of the child during the reunion with the mother (or other attachment figure). Ainsworth et al. (1978) identified three different attachment types: Group A avoidant (showing few emotions when mother returned, avoiding close contact[6]), Group B secure (proximity and contact seeking, searching comfort when distressed and negatively aroused, showing their feelings), and

[6]The behavior of avoiders during the Strange Situation Test was previously interpreted as a mature reaction and, therefore, classified as Group A. However, further analysis revealed that those children had insensitive mothers.

Group C anxious-ambivalent (conflict between proximity seeking and avoiding contact to the attachment figure, angry protest behavior). The mother's sensitivity, observed one year prior to the Strange Situation Test at home, was associated with child behavior during this mild form of stress induction. Secure children had highly sensitive and responsive mothers while the other two groups, A and C, had unresponsive mothers (Ainsworth et al., 1978; for a meta-analysis linking mother's sensitivity and child's attachment style, see DeWolff & van IJzendoorn, 1997). A meta-analysis by Fox, Kimmerly, and Schafer (1991) combining different US, European, and Israeli samples revealed that at the age of 12 months, 65.2% of the children were classified as securely attached to their mothers (Group B), 20.4% as avoidant (Group A) and 14.4% as anxious-ambivalent (Group C). Attachment classifications to their fathers were highly comparable (Fox et al., 1991).

Further investigations into children's attachment concentrated on the number of types for attachment classifications (Fraley & Waller, 1998). The most prominent enlargement of types was Main's Type D, described by a disorganized-disoriented pattern of behavior which was impossible to classify in Ainsworth's A, B, or C types (Main & Solomon, 1986).

From the age of adolescence, attachment to the mother or the father can be assessed by the adult attachment interview (AAI) by George, Kaplan, and Main (1985). According to interviewee's descriptions of past experiences and current reflections during the semi-structured interview, his or her attachment to a primary attachment figure can be classified as secure/autonomous, insecure/dismissive or insecure/preoccupied as well as unresolved as residual category. However, this interview presumes that the interviewee has the ability to reflect on childhood experiences with primary care givers. It does not assess the current quality of the relationship with the mother or the father. With growing age, not only the measurement construct of attachment alters (Strange Situation Test vs. interview or self-report), but the quality and importance of different relationships of an individual also change.

Nonetheless, in a study by Bogaerts, Vanheule, and Desmet (2006), self-reported peer attachment was a mediator for the association between parental attachment and temporary feelings of emotional loneliness in graduating psychology students.

3.2 Attachment in adult close relationships

Although attachment has its origin in childhood, it also has an impact on life as an adult (Bowlby, 1988). Possible attachment figures of an adult are parents, siblings, close friends, and the romantic partner. In contrast to adult-child dyads, the interplay between the behavioral systems attachment and caregiving (and sexuality) is tighter and less separable; the attachment relationship in adulthood is suggested to be reciprocal and symmetric (e.g., Fraley & Shaver, 2000).

The relationship to a romantic partner is central to life as an adult. The social psychologists Hazan and Shaver (1987) were pioneers in describing love as an attachment process. The authors assumed that adult romantic relationships underlie the same biological system as infant-caregiver relationships, and that individual differences are similar and relatively stable. However, they indicate that not every romantic relationship in adulthood is necessarily an attachment relationship. An attachment relationship is only present if an individual seeks and maintains proximity to the partner, and uses him or her as a secure base for exploration as well as a secure haven in times of distress. Several authors on the topic of adult relationships do not differ between secure base and secure haven behaviors; they combine those two aspects in one, describing them as secure base processes (e.g., Crowell, Treboux, Gao et al., 2002; Davila & Kashy, 2009; Waters & Waters, 2006).

According to Ainswoth et al. (1978), Hazan and Shaver (1987) formulated three attachment types for romantic relationships. In their first study, they advertised a love quiz in

a newspaper which asked participants to rate their most important love relationship in terms of different statements and adjectives. Finally, participants had to choose which type would best describe their personality from one of the following descriptions of three attachment styles.

Table 1: Hazan and Shaver's (1987) descriptions for adult attachment types

Secure:	"I find it relatively easy to get close to others and am comfortable depending on them and having them depend on me. I don't often worry about being abandoned or about someone getting too close to me."
Avoidant:	"I am somewhat uncomfortable being close to others; I find it difficult to trust them completely, difficult to allow myself to depend on them. I am nervous, when anyone gets too close, and often, love partners want me to be more intimate than I feel comfortable being."
Anxious/Ambivalent:	"I find that others are reluctant to get as close as I would like. I often worry that my partner doesn't really love me or won't want to stay with me. I want to merge completely with another person, and this desire sometimes scares people away."

Fifty-six percent of 574 participants rated themselves as secure, 25% as avoidant and 19% as anxious-ambivalent. The additional adjective ratings revealed higher levels in security and trust for securely attached individuals, more jealousy for anxious-ambivalent individuals and stronger fear of intimacy for avoidant individuals (39% of the participants rated a past

relationship). Hazan and Shaver (1987) replicated their findings with a student sample, reducing a possible self-selection bias of the sample. However, the methodological weakness of Hazan and Shaver's theory-based approach could not be solved with the student sample. The forced choice and the use of one single item are methodologically not reliable, depending heavily as it does on the wording of the item.

Bartholomew (1990; Bartholomew & Horrowitz, 1991) enlarged attachment types in adulthood by dividing the avoidant style into two groups (dismissive-avoidant vs. fearful-avoidant). Bartholomew suggested a four-group model based on Bowlby's description of the inner working model, including representations of the self and other. The four groups are a combination of a positive or negative model of the self (worthy vs. unworthy of love) on the one side, and a positive or negative model of the other (responsive vs. rejecting) on the other side.

Table 2: Bartholomew's four-group model of adult attachment

		View of the Self	
		Positive	Negative
View of Other	Positive	*Secure*	*Preoccupied*
	Negative	*Dismissive-avoidant*	*Fearful-avoidant*

The *secure* group is characterized by a positive view of the self and other (see Table 2). The preoccupied group has a positive view about the other, but a negative view of the self; according to authors, this group maintains the positive view of others by self-blaming behavior after a rejection. Bartholomew associated the preoccupied group with Hazan and Shaver's (1987) anxious-ambivalent style. For individuals with a negative view of the other (also described as high in avoidance), she further distinguished between a group with a

positive self-view, the dismissive-avoidant group, and those with a negative self-view, the fearful–avoidant group. The latter was associated with Hazan and Shaver's (1987) avoidant style and can be described by a desire to prevent oneself being hurt (original description: "I am somewhat uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I sometimes worry that I will be hurt if I allow myself to become too close to others"). The dismissive-avoidant group maintains independence by downplaying the significance of close relationships (original description: "I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me."). Bartholomew linked this group to Main's Type D (Main & Solomon, 1986). Bartholomew's classification system was used for family as well as peer relationships including self-report, friend-report, and interview-based ratings by forced choice or rating scales per group description (Bartholomew & Horrowitz, 1991).

Beside Bartholomew and collaborators, other authors have tried to solve the methodological problem of forced choice as Hazan and Shaver's (1987) measure by letting participants rate how well each type (e.g., Levy & Davis, 1988) or each sentence of different type descriptions (e.g., Simpson, 1990) matched to their personality. Among other authors, Collins and Read (1990) generated new items to describe the given attachment types. Although, their eighteen items resulted in a three-factor solution (Anxiety, Depend, and Close), the factors Depend and Close were moderately correlated, and, according to Ainsworth et al. (1978), only two discriminant functions were necessary to classify the attachment of individuals.

As a consequence of Bartholomew's suggestions (1990; Bartholomew & Horrowitz, 1991) of a four-group model represented by two dimensions, of the self and other, a debate on attachment types vs. attachment dimensions started (for an overview, see J. Feeney & Noller,

1996). Fraley and Waller (1998) offered statistical evidence for the use of attachment dimensions rather than attachment types. These authors argued that “people differ in degree rather than in kind” (Fraley & Waller, 1998, p. 108), and that information about individual differences is limited with types (within attachment types a lot of variance is present).

At the same time, Brennan, Clark, and Shaver (1998) conducted a systematic factor analysis over 320 self-report items of different attachment measures for romantic relationships, revealing two orthogonal dimensions for attachment: anxiety and avoidance. Attachment anxiety reflects the degree of worrying about being unloved and abandoned. Avoidance reflects the degree of discomfort with intimacy and dependence on others.

Brennan, Clark, and Shaver (1998) described how the four attachment groups suggested by Bartholomew could be represented by anxiety and avoidance. Secure individuals are characterized by low levels in anxiety and avoidance (see Figure 5). Individuals with insecure attachment styles, on the other hand, have high levels either in attachment anxiety or avoidance, or in both dimensions: preoccupied individuals are highly anxious, but not very avoidant; dismissive-avoidant individuals are highly avoidant, but not very anxious; and fearful-avoidant individuals are highly anxious as well as highly avoidant. As assumed by Fraley and Waller (1998), attachment dimensions explained more variance in different attachment related variables (emotions and cognitions regarding intimacy and sexuality) in comparison to attachment categories (Brennan et al., 1998).

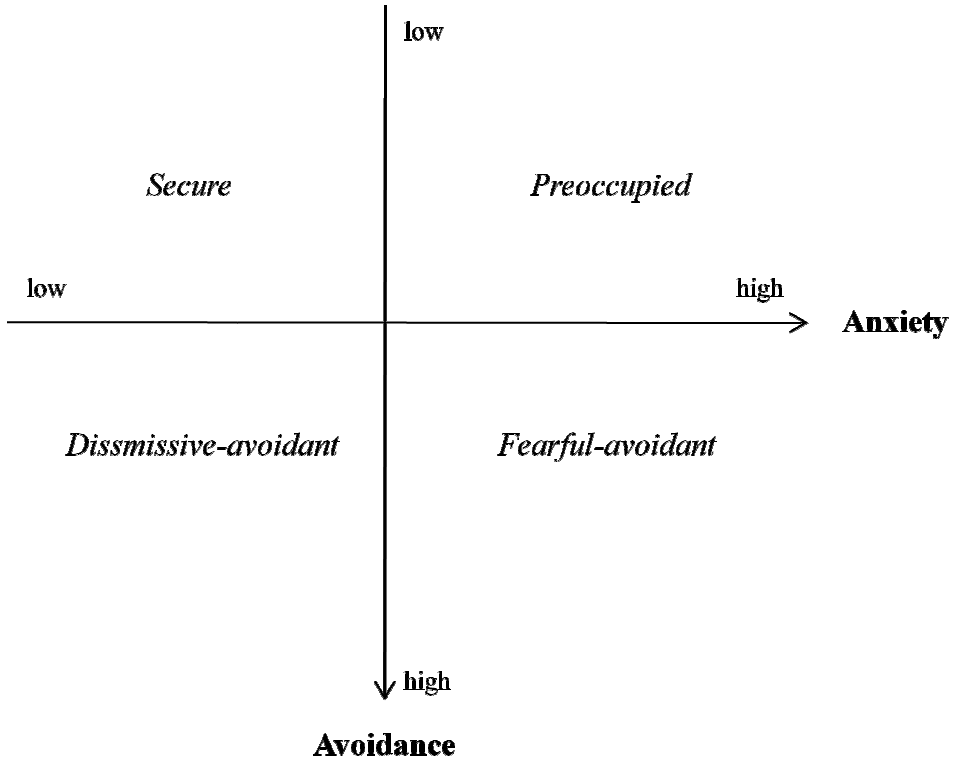

Figure 5: Two underlying dimensions of attachment (Brennan, Clark, & Shaver, 1998) representing Bartholomew's four attachment groups

Attachment anxiety and avoidance were further included in theories of emotion regulation (Fraley & Shaver, 2000; Kobak & Sceery, 1988; Mikulincer & Shaver, 2003; Shaver & Mikulincer, 2007). Bowlby (1969) described an emotion regulation function for attachment beside the function of protection in times of threat. Secure attachment is related to adequate emotion regulation, thus offering the possibility of relying on others. Kobak and Sceery (1988) integrated Bowlby's interpretations in their affect regulation theory and differentiated between "hyperactivating" and "deactivating" strategies as pendants to Bowlby's "protest" and "compulsive self-reliance" descriptions for insecure attachment. Fraley and Shaver (2000) later conceptualized attachment anxiety and avoidance as two dimensions representing emotional and behavioral regulation processes (see Figure 6), before Mikulincer and Shaver (Mikulincer & Shaver, 2003; Shaver & Mikulincer, 2007) adopted the terms of hyperactivating and deactivating strategies for their emotion regulation theory.

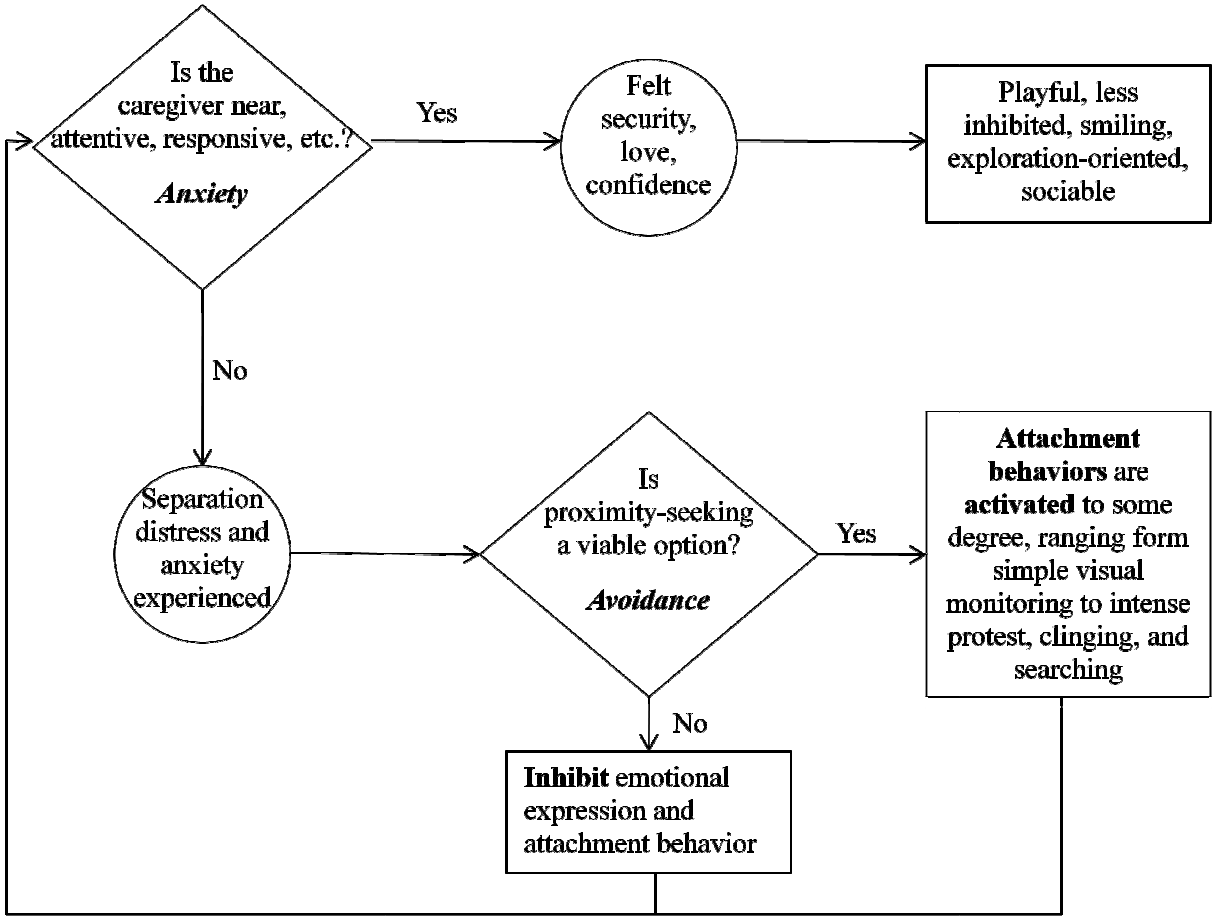

Figure 6: Attachment anxiety as the emotional and avoidance as the behavioral component of the emotion regulation process (Fraley & Shaver, 2000, p.134)

Hyperactivating and deactivating strategies represent secondary attachment strategies resulting from frustrating attachment experiences when seeking proximity. Like any attachment strategy, they are activated in reality or imagination when an individual perceives stress or a threat. A perceived threat is subjective and can also arise from inner sources (e.g., worries or dysfunctional cognitions) (Mikulincer & Shaver, 2003).

Hyperactivating strategies are related to attachment anxiety and describe the tendency to deal with distress by exaggerating primary attachment behaviors in order to win others' love and affection. These strategies include hypersensitivity and rumination over cues for rejection

or abandonment and, as a result, clinging and controlling behaviors. Such behaviors inhibit the development of a positive self-image and reinforce overdependence on a partner.

Attachment avoidance, in contrast, is related to the tendency to deactivate and inhibit the activation of the attachment system when distressed. These strategies include excessive self-reliance to avoid intimacy and conflict. “Negative perceptions of others related to deactivating strategies may be guided, in part, by a preference for distance and a desire to view the self more positively than others” (Mikulincer & Shaver, 2003, p. 86). As a result of negative experiences with attachment figures when distressed, strategies of suppressing emotions, downplaying threats, and reduced monitoring of attachment figures serve to inhibit the activation of the attachment system (Shaver & Mikulincer, 2007).

Deactivating and hyperactivating strategies can automatically be activated without being necessarily conscious. Thus, according to Fraley and Shaver (2000), a conceptualization of emotion regulation for attachment would fit better, since mental representations of the self and other (proposed by Bowlby, 1973, and further developed by Barholomew, 1990) would not be applicable for infants and nonhuman species. They further criticized the suggestion that a positive view of others would not be appropriate for the preoccupied style, since such individuals tend to react with negative behavior toward others (e.g., with anger, jealousy, or negative cognitions).

3.3 Consistency of infant and adult attachment

Consistent with reports for childhood (Fox et al., 1991), most adults are securely attached. In a nationally representative sample of the United States, 59% of individuals were classified as secure, 25% as avoidant, and 11% as anxious, as assessed by individual ratings of each of

the three attachment types described by Hazan and Shaver (Mickelson, Kessler, & Shaver, 1997).

Several studies have investigated the relation of infant attachment and adult romantic attachment and the relationship quality of romantic relationships. In a longitudinal study by Simpson, Collins, Tran, and Haydon (2007), the association between infant attachment and relationship quality in the early twenties was mediated by peer competence during first years at school (teacher ratings) as well as felt security with close friends at the age of 16 years (interview-based ratings). Salvatore, I-Chun Kuo, Steele, Simpson, and Collins (2011) found that individuals who were previously rated as securely attached in the Strange Situation Test were observed to recover faster from relationship conflict in the lab. Secure attachment also had a positive effect on partners' emotional recovery.

Attachment classifications assessed with the AAI seem to be mainly stable throughout the transition to marriage. In a study by Crowell, Treboux, and Waters (2002), 78% of partners received the same classification three months prior to and eighteen months after marriage. Partners who changed from insecure to secure attachment reported more positive feelings than those who remained insecure. Davila, Karney, and Bradbury[7] (1999) found an increase of security in romantic attachment for childless newlyweds over the first two years of marriage resulting from a decrease in attachment anxiety and an increase in comfort with closeness. There seem to be possibilities for positive changes within romantic relationship experiences.

However, in interpreting assessed levels of attachment anxiety and avoidance, concern may always arise about the measure used[8] (adult vs. infant attachment; interview vs. self-

[7] See this article (Davila, Karney, & Bradbury, 1999) also for theoretical models of attachment change, and Fraley (2002) for mathematical modeling of attachment stability during the first 19 years.

[8] The most common self-report measures are actually: Experiences in Close Relationships (Brennan et al., 1998), Adult Attachment Scales (Collins & Read, 1990), Relationship Styles Questionnaire (Griffin & Bartholomew, 1994) and Simpson's attachment scales (Simpson, 1990). Other possibilities to assess adult attachment is offered by the Current Relationship Interview by Crowell and Owens (1998).

report; attachment types vs. dimensions) as well as the specifics of the sample. Attachment measures may be biased in samples consisting only of partners in close relationships. Attachment avoidance may reach higher levels in a sample of singles, since highly avoidant individuals have a higher likelihood of divorce (Ceglian & Gardner, 1999), while high levels in attachment anxiety may be overrepresented in distressed couples, because those individuals are more likely to stay in unhappy marriages (Davila & Bradbury, 2001).

EMPIRICAL STUDIES

4. Adult attachment, stress, and dyadic coping

4.1 Perceived stress and attachment

Attachment anxiety was positively related to perceived stress in different samples and situations (e.g., Maunder, Lancee, Nolan, Hunter, & Tannenbaum, 2006; Mikulincer, Florian, & Weller, 1993; Ronen & Baldwin, 2010). In the study by Mikulincer et al. (1993), as an example, adult attachment was related to the perceived stress and coping of Israeli students (reported two weeks after the war). Positive associations were found between ambivalent attachment (anxiety) and distress, and between avoidance and somatization symptoms; while secure attachment was associated with more support seeking. Observing couples at the airport, Fraley and Shaver (1998) observed more separation distress in highly anxious women, while highly avoidant women were observed to be more distancing to their leaving partner. However, this match with the behavioral and appraisal component of Fraley and Shaver's (2000) emotion regulation theory of attachment was only found in women. In men, associations were less clear.

Studying the impact of stress on couples, it is necessary to differentiate between threats to the individual (e.g., work stress) and threats to the relationship (e.g., separation, conflict). The following two studies are an example of extradyadic stress provoked by a threat to the individual, the Trier Social Stress Test (Kirschbaum et al., 1993).

4.2 Stress recovery and dyadic coping: Testing a moderation effect of insecure attachment (STUDY 1)

Stress recovery after partner's positive support: Highly anxious women benefit less[9]

Abstract

Social support is known for its stress buffering effect. Individuals who received support from their romantic partners prior to a stressful task had decreased stress reactivity in experimental studies. However, not all individuals seem to benefit equally from a partner's support. Adult attachment has been suggested to moderate the effects of support on health and well-being. Furthermore, as receiving support has long-lasting consequences for the individual, physiological responses during stress recovery are of particular interest. The goal of the current study was to examine whether positive partner support would enhance cortisol stress recovery. It was further hypothesized that individuals with high levels in attachment anxiety or avoidance would benefit less from support compared to more securely attached individuals. Therefore, we experimentally induced stress in either the woman or the man of *N* = 123 heterosexual couples and observed the dyadic coping process following stress. Results show that stressed individuals recovered faster from stress the more positive support they received from the partner. This effect was decreased in highly anxious women. Contrary to our expectations, there was no moderating effect for attachment avoidance. These findings suggest that, particularly in women, attachment might modulate the effects of partner support on physiological stress recovery.

Keywords: social support, dyadic coping, stress recovery, attachment, close relationships

[9] Paper by N. Meuwly, G. Bodenmann, J. Germann, T. N. Bradbury, B. Ditzen, and M. Heinrichs. The research project „The impact of external stress on couples' interaction" (Bodenmann, Heinrichs, & Bradbury) was funded by the Swiss National Science Foundation (SNF 100014-115948 and SNF 100014-129627).

Introduction

Social support is linked to positive effects for well-being and health. Several studies have shown a stress buffering effect for perceived support as well as actually received support from the romantic partner on one's well-being (e.g., Bodenmann, 2000; Cutrona, 1996; Dehle et al., 2001; Uchino, 2006). Previous experimental studies confirmed this stress buffering effect; individuals who received support prior to stress induction had a decreased stress reactivity in cortisol (e.g., Ditzen et al., 2007; Kirschbaum, Klauer et al., 1995). However, findings for women are less consistent in comparison to men. As most of the supportive interactions in a couple's everyday life occur following a stressful situation, at least in the context of extradyadic stress, recovery from stress should be of particular interest. The goal of the current experimental study was to examine the effect of partner support following a stressful situation on stress recovery. Furthermore, the suggested enhancing effect of partner support on physiological stress recovery was tested for a moderation effect of insecure attachment, one possible personality factor that could explain individual differences. Couples were randomly assigned to two experimental conditions, where either the female or male partner was stressed by the Trier Social Stress Test (TSST; Kirschbaum et al., 1993). After stress induction, couples were left alone and had the possibility to cope with the stressful situation. During the experiment, saliva samples were repeatedly assessed to track cortisol levels.

Stress and social support

According to Lazarus's Transactional Model of Stress, stress is a result of an evaluation process (Lazarus & Folkman, 1984). An individual experiences stress when perceived demands of a current situation outweigh the available resources to adapt to the new situation; the demands are perceived to be overbalanced. The evaluation of a current situation as a threat, loss, or challenge results in different emotions and physiological reactions. Fear as a result of perceived threat may "freeze" an individual's ability to react, while the perception of

a challenge can mobilize additional energy to adapt to a new situation. Perceived resources, which are simultaneously evaluated as the demands, can be external (e.g., having the money to afford something, or supportive friends) and internal in the form of physical health, personal characteristics (e.g., hardiness, self-esteem) or competencies such as adaptive coping forms.

For individuals being in a close relationship, the perception of the partner as a reliable source of support can represent an important enlargement of available resources. The extension of Lazarus's model by a dyadic perspective described by Bodenmann (1995b; Bodenmann, 2000) offers a theoretical basis for a stress buffering effect of social support. The appraisal of demands and available resources in a demanding situation may be shifted; more resources are perceived to be present what may increase the likelihood of perceived controllability within a given situation. Or, during the constant reappraisal process of demands and resources, an initially perceived threat or loss may change faster to a perceived challenge, when the partner is actually providing support.

The romantic partner is the major source of support for most individuals. He or she is the first person to rely on when stressed (Bodenmann, 2000; Coyne & DeLongis, 1986). Dyadic coping, an interpersonal process in which partner A supportively reacts to partner B's stress communication, is an especially helpful form of support. Positive dyadic coping experiences enhance trust and intimacy between partners what improves relationship quality under stress (e.g., Bodenmann, 2005; Bodenmann & Cina, 2006; Bodenmann et al., 2006; Cutrona et al., 2005; Pasch & Bradbury, 1998; Sullivan et al., 2010). However, dyadic coping is only efficient, as long as the extradyadic stress does not spillover into intradyadic stress resulting in a conflict between partners (e.g., Bodenmann & Cina, 2006; Cutrona, 1996; Neff & Karney, 2004). It is, therefore, especially relevant to track support processes in couples to learn more about efficient support processes in order to undermine a negative spillover.

Previous experimental studies examining the effect of social support in the context of extradyadic stress concentrated on different social support conditions. In a study by Kirschbaum, Klauer, Filipp, & Hellhammer (1995) inducing stress with the Trier Social Stress Test (TSST; Kirschbaum et al., 1993), men exhibited the weakest stress reaction following a supportive interaction with their romantic female partner, in comparison to support from a stranger or no support at all. Findings are less clear for women. In the study by Kirschbaum et al. (1995), women showed the strongest stress reaction after partner support, while in the study by Ditzen et al. (2007), women with prior physical contact with the romantic partner (standardized neck-shoulder massage) exhibited the weakest stress reaction in comparison to verbal support from the partner or no support prior to the TSST. It needs, therefore, to be clarified if women may benefit more from nonverbal than verbal support by the partner with regard to physiological stress responses. However, to date no data exist on how couples actually interacted in the laboratory when providing support. In an experimental study by Bodenmann and collaborators (Bodenmann & Perrez, 1992, 1995), the quality of observed couples' interaction decreased about 40% under stress. It can, therefore, be important to open the "black box of support" to learn more about its benefits for partners' well-being.

HPA Axis

The hypothalamic-pituitary-adrenal (HPA) axis is, beside the much faster stress response through the sympathetic nervous system, relevant for an efficient stress reaction. The distribution of cortisol, the end product of the HPA axis, in blood enables the body to efficiently react to stress. An adaptive stress reaction is gradually diminished by a negative feedback system resulting in stress recovery. During recent years, particularly this stress recovery process has gained more and more interest (e.g., Christenfeld et al., 2000; Miller et al., 2007; Roy et al., 1998). The adequate capability of the body to regain homeostasis (see

McEwen, 1998) was found predictive of a number of clinical disorders (de Kloet et al., 2005; Heim & Nemeroff, 2001; Heim et al., 2002; McEwen, 2000).

There is growing evidence that partner's cortisol levels are related to couples' interactions in everyday life (e.g., Ditzen, Hoppmann et al., 2008; Saxbe et al., 2008; Slatcher et al., 2010) as well as conflict interactions conducted in the laboratory (e.g., Ditzen et al., 2009; Fehm-Wolfsdorf et al., 1999; Powers et al., 2006). Studies examining the effect of extradyadic stress on cortisol stress reactions were mostly using the TSST (Kirschbaum et al., 1993). The combination of social evaluation and uncontrollability within the TSST is an effective form for stress induction independent from the romantic partner (for a review, see Dickerson & Kemeny, 2004). As mentioned before, previous studies focused on support prior to a stressful task (Ditzen et al., 2007; Kirschbaum, Klauer et al., 1995). We are especially interested in stress recovery as support from the partner mostly occurs following a stressful situation.

Attachment and the perception of support processes

The benefit of partner support for stress recovery may be influenced by the perception of support processes. Insecure attachment is a potential factor for negative interpretations of partner support. In contrast to securely attached individuals, insecurely attached individuals have negative representations about the self and support providers; they tend to underestimate and negatively perceive others as a reliable source of support (Bowlby, 1973; Fraley & Shaver, 2000). Insecure attachment is characterized by either high levels in attachment anxiety, high levels in attachment avoidance, or high levels in attachment anxiety and avoidance (e.g., Brennan et al., 1998; Mikulincer & Shaver, 2003). Attachment anxiety reflects the degree of worrying about being unloved and abandoned. Highly anxious individuals tend to be preoccupied with cues for rejection or abandonment. Attachment avoidance, on the other hand, reflects the degree of discomfort with intimacy and dependence on others. Highly avoidant individuals tend to rely on the self and prefer autonomy.

The relation between insecure attachment and negative perceptions of support processes was supported by self-report (e.g., Bodenmann, 2000; Bradford, Feeney, & Campbell, 2002; Davila & Kashy, 2009; Gallo & Smith, 2001) as well as experimental data (e.g., Collins & Feeney, 2004). In the study by Bradford et al. (2002), women's attachment anxiety was negatively related to daily satisfaction with partner support. Highly anxious women perceived the interactions with the partner as emotionally more hurtful. Davila and Kashy (2009) confirmed negative perceptions of daily support for individuals reporting high levels in avoidance (i.e., low comfort with intimacy) as well as high levels in anxiety. Campell, Simpson, Boldry, and Kashy (2005) differentiated between negative and supportive interactions with the partner in a dairy study. Interestingly, anxiety was associated with perceiving more conflict and negative daily interactions with the partner. Furthermore, highly anxious individuals evaluated these interactions as more hurtful and reported more negative consequences for the relationship. Avoidance, on the other hand, was a relevant predictor of the perception of supportive interactions. Highly avoidant individuals reported less positive experiences during supportive interactions, but they did not report less supportive interactions with their partners than more secure individuals.

A different pattern of attachment anxiety and avoidance in the perception of dyadic interaction was also present in an experimental study by Collins and Feeney (2004). Attachment avoidance was related to negative perceptions of partner support notes *before* a stressful speech task, while anxiety was related to negative perceptions of partner support notes *after* the speech task. However, negative perceptions were only significantly associated with attachment in the low-support group, where support was more ambivalent and offered more room for negative interpretations in comparison to high support notes. These findings suggest a different mechanism for attachment anxiety and avoidance in the perception of dyadic interactions.

Ditzen et al. (2008) recently tested a moderation effect of attachment anxiety and avoidance for the association between partner support and stress reactivity. They found a main effect for partner support buffering cortisol stress reactivity to the TSST. But high and low anxious (groups separated by median split) as well as high and low avoidant men did not differ in their cortisol levels, although attachment anxiety and avoidance were related to perceived stress levels. As only men were stressed in this study, it remains to determine whether a moderation effect would be present in stressed women.

The current study

We conducted an experimental study inducing extradyadic stress (TSST; Kirschbaum et al., 1993) to trigger partner support after stress. Stressed individuals with more supportive partners were expected to recover faster from stress. As self-reported stress may be biased by attachment scales and does not necessarily reflect physiological stress response (for an overview, see meta-analysis by Hjortskov, Garde, Orbaek, & Hansen, 2004), we included salivary cortisol in order to capture the physiological recovery to stress.

We assumed the accelerating effect of partner support in stress recovery to be moderated by attachment anxiety and avoidance, as both attachment dimensions are related to negative perceptions of support processes. We hypothesized that highly anxious as well as highly avoidant individuals would benefit less from partner support and, therefore, recover slower from stress.

To test these hypotheses for women and men, we included the following two experimental conditions: Either (1) the woman, or (2) the man of a heterosexual couple was stressed by the TSST. Although Powers et al. (2006) found gender specific associations between attachment scales and stress reactivity in the context of a conflict discussion (women's avoidance and men's anxiety were related to an increased stress reactivity), we do not formulate gender

specific hypotheses as the effect of partner support in the context of an extradyadic stress may depend less on gender roles.

Method

Sample

Couples were recruited by distributing flyers and advertising information on internet platforms and in newspapers. All couples had to meet the following inclusion criteria: (a) willingness of both partners to participate, (b) exclusively dating since at least 12 months, and (c) both partners aged between 20 and 45 years. Additionally, both partners had to communicate in German for reasons of behavioral data analysis. Due to measurement of cortisol throughout the experiment, exclusion criteria for participation were heavy smoking (more than 10 cigarettes per day), chronic mental or physical illness, medication, and former participation in the TSST (cf. Schommer, Hellhammer, & Kirschbaum, 2003). Women were excluded if they had an irregular menstrual cycle or were currently pregnant or breastfeeding. All women participated in the experiment during the luteal phase of their menstrual cycle.

132 heterosexual couples participated in the current study. Nine couples had to be excluded from the analyses for the following reasons: four couples were not talking German during the observed interaction, one couple provided insufficient compliance during the experiment and four couples were excluded due to irregular cortisol levels. The final sample size was $N = 123$ couples, with 62 couples in the first (woman stressed) and 61 couples in the second experimental condition (man stressed). Overall, mean age was 25.9 years ($SD = 5.4$) for women and 28.1 years ($SD = 6.2$) for men. A major part of participants (57% of women and 46% of men) was still in continuous education, mostly at university. But, only one third of female and one fifth of male participants did not work at the time of the study. Half of the

couples were cohabitating, although only 17% were married. Most of the couples had no children (87%). Relationship duration ranged from one to 19 years (M = 4.4, SD = 3.5). The majority of partners were satisfied with their relationship (M = 4.4; SD = 0.4) (RAS-scale ranging from 1 to 5; Hendrick, 1988). Couples in different experimental conditions (woman vs. man stressed) did not differ with regard to these demographic characteristics ($F \leq 1.769$, $p \geq .186$).

Procedure

Overview. Couples were examined in our labs at the University of Fribourg (20% of the experiments) and the University of Zurich. The main experimental room was equipped with a couch and two small tables with a computer for each partner. Stress induction was conducted in a separate room. Couples were randomly assigned to three different experimental conditions: Either the woman (experimental condition 1), the man (experimental condition 2), or both partners were stressed (experimental condition 3) with the TSST (in the current study the third experimental condition was excluded, because the process of dyadic coping in this group is not comparable, since both partners needed and provided support at the same time). Couples were not aware of alternative experimental conditions. Experiments lasted 120 to 150 minutes depending on how long partners needed to fill out the questionnaires. All experimental sessions were conducted between 4 and 8 p.m. in order to capture maximum cortisol reactivity.

Introduction. The two investigators first gave a brief introduction to the study and different measures in a non-threatening and non-stressful manner. Both partners signed informed consent, before they completed a first set of questionnaires each on a separate computer.

Stress induction (Trier Social Stress Test; Kirschbaum et al., 1993). The investigator guided the partner who had to participate in the TSST into a second room. The TSST audience, consisting of one woman and one man dressed in a white coat, was seated behind a table and waited for the participant. A video camera on the left side of the table was directly pointing to the participant. During the first contact with the participant, the audience was not talking at all. The investigator gave a brief introduction to the participant (reading it aloud to standardize the procedure). After this first introduction, the participant was guided into a third room, where he or she had time to prepare individually for the mock job interview. After 5 minutes, the investigator guided the participant back into the TSST room and gave a second introduction. Participants were told that members of the audience were experts in nonverbal behavior analysis, and that participants had another—not clearly defined—task to accomplish after the mock job interview. The investigator then left the room, and the woman from the audience asked the participant to start presenting himself. When the participant stopped talking, he or she was first prompted to continue his speech before standardized questions were asked (e.g., “Why do you think you should get this job?”; “What makes you more qualified than other candidates?”; “What is your opinion about team work?”). Reactions of the audience were brief, neutral, and distant (all verbal guidance was done by the woman while the man had the role of a mute observer). The mock job interview lasted 4 minutes. After that time, the second task was introduced. Participants had to solve a cognitive task and were asked to continuously subtract the number 17 from 2043. Every time participants made a mistake, they had to restart at 2043. This second task lasted another 4 minutes, before the audience interrupted the participant and asked him or her to leave the room and rejoin investigators.

Support interaction. After the TSST, couples were reunited in the main room. They were then told that investigators had to “check if the job interview was recorded properly, so that

the audience could start to analyze it". The couple was left alone for 8 minutes while the interaction was videotaped. There was no specific instruction that partners should support each other (unstructured interaction).

Debriefing. Finally, investigators returned to the couple and partners were asked to complete a second set of questionnaires. At the end of the experiment, couples received a detailed debriefing. Each couple was paid a compensation of 100 Swiss francs (approx. 100 Dollars) for participation.

Measures

Observed Dyadic Coping behavior. The interaction after the TSST was videotaped and rated according to SEDC (System to assess dyadic coping [System zur Erfassung des dyadischen Copings]; Bodenmann, 1995a). For the current analysis we discriminated between positive and negative supportive behaviors of the unstressed partner. *Positive support* included: problem-focused (reactions to partner asking for advice), emotion-focused (e.g., empathic understanding, showing solidarity with the partner, validating partner), and nonverbal support (e.g., holding, hugging, kissing) as well as listening attentively to the partner and showing interest (as a form of positive reinforcement). *Negative support* was coded if the provided support was insensitive, superficial, or hostile (e.g., ignoring partner's stress communication, making fun of partner's feeling, diminishing partner's experience). Support behavior was coded every 10 seconds (time-sampling) by two independent coders; one coding woman's behavior, the other coding man's behavior. Coders were not informed of the hypotheses of the study. Interrater-agreement was satisfying (10% of tapes coded by both observers): Cohens kappa $\kappa = .869$. Variables represent relative frequencies (absolute frequency divided by number of codable intervals) of positive and negative support observed during the 8-minute-interaction following the TSST.

Attachment in close relationships. Attachment for romantic relationship was assessed by the Bochumer Bindungsfragebogen (Neumann, Rohmann, & Bierhoff, 2007), a validated German version of the Experience in Close Relationships scale (ECR) by Brennan, Clark, and Shaver (1998). This questionnaire includes 36 items representing two continuous dimensions of attachment, namely anxiety and avoidance. Each item was rated on a 7-point-likert scale and then averaged for the two dimensions. Low measures of attachment anxiety and avoidance represent secure attachment to romantic partners in general (not specific to the current relationship). Internal consistency of both scales were high for female (f) and male (m) partners (anxiety: $\alpha_f = .85$ / $\alpha_m = .82$; avoidance: $\alpha_f = .78$ / $\alpha_m = .84$).

Physiological stress measure (salivary free cortisol levels). Cortisol was measured using a commercially available sampling device (Salivette; Sarstedt, Germany) at six measurement time points (baseline prior to the TSST, 15 min, 20 min, 35 min, 50 min, and 60 min after TSST. As cortisol stress reaction in saliva can only be measured with a delay of 15 to 20 minutes (de Kloet et al., 2005), all these measures were needed to adequately describe stress reaction and recovery. After chewing for about 60 sec during the experiment, the salivette tubes were stored at −20°C until required for biochemical analysis. Before assaying for free cortisol, samples were thawed and spun at 3000 rpm for 10 min to obtain 0.5-1.0 ml clear saliva with low viscosity. The free cortisol concentrations in saliva (nmol/L) were analyzed in a laboratory of the Technical University of Dresden using a commercially available chemiluminescence immunoassay (CLIA; IBL Hamburg, Germany). Four couples were excluded for cortisol analyses because of unnormal measurement values: two non-responders and two individuals showing hypercortisolism (more than 2 SD above the mean stress reactivity).

Statistical Analysis

We used hierarchical linear modeling (HLM Version 6; Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2002) in order to analyze the data. Repeated measures of cortisol (level 1) were nested within individuals (level 2). Estimation of cortisol stress recovery includes the following five measurement points: 15 min, 20 min, 35 min, 45 min, and 60 min after TSST. The first measurement point (15 min after the TSST) represents the peak in stress reaction (intercept); as mentioned before, cortisol stress reaction measured in saliva is 15 to 20 min delayed. The estimated linear curve for stress recovery was controlled for baseline cortisol measured before the TSST. This additional information is needed to adequately represent participants stress reaction resp. increase in cortisol for the estimation of stress recovery (relevant for the estimated intercept). Adding the initial point of cortisol includes also the information which level the organism "needs to reach" to be recovered from stress (relevant for the estimated slope). All models for cortisol stress recovery were separately estimated for stressed women (experimental condition 1) and stressed men (experimental condition 2). For stressed women, we additionally controlled for the intake of oral contraceptives (dummy coded: no OC = -.5; with OC = +.5) according to previous findings for cortisol stress reactivity (Kirschbaum, Kudielka, Gaab, Schommer, & Hellhammer, 1999; Kirschbaum, Pirke, & Hellhammer, 1995). After adding a time effect on level 1, we first estimated the following *base model* (model 1) including control variables:

Level 1: $Cort_{ti} = \pi_{0i} + \pi_{1i}\,(time)_{ti} + e_{ti}$

Level 2: $\pi_{0i} = \beta_{00} + \beta_{01}$* baseline cortisol + β_{02}* OC + r_{0i}

$\pi_{1i} = \beta_{10} + \beta_{11}$* baseline cortisol + β_{12}* OC + r_{1i}

π_{0i} represents the individual-specific intercept (peak in the stress reaction after the TSST) and π_{1i} the individual-specific slope (the rate of change) of estimated cortisol levels. Time was

coded in minutes (the intercept equates to t_0). Unstandardized coefficients for predictors of the slope represent, therefore, the change in the slope per minute during stress recovery resulting from a 1-unit change on the scale of the predictor. Predictors of the intercept and slope were all grand-mean-centered before entered in the model (with the exception of the dummy variable OC).

All additional level-2 predictors, positive and negative support as well as attachment scales anxiety and avoidance, were first included in separate models:

Dyadic coping model (model 2):

$$\text{Level 2:} \quad \pi_{0i} = \beta_{00} + \beta_{01}* \text{baseline cort.} + \beta_{02}* \text{OC} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}* \text{baseline cort.} + \beta_{12}* \text{OC} + \beta_{13}* \text{positive support} + \beta_{14}* \text{negative support} + r_{1i}$$

Attachment model (model 3):

$$\text{Level 2:} \quad \pi_{0i} = \beta_{00} + \beta_{01}* \text{baseline cort.} + \beta_{02}* \text{OC} + \beta_{03}* \text{anxiety} + \beta_{04}* \text{avoidance} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}* \text{baseline cort.} + \beta_{12}* \text{OC} + \beta_{13}* \text{anxiety} + \beta_{14}* \text{avoidance} + r_{1i}$$

As the intercept represents the peak in stress reaction after the TSST, we included positive and negative support only as predictors for the slope. At this time, partner's support could casually have no effect on the intercept as the interaction with the partner was temporally subsequent. One could argue that anticipated support could have an effect on stress response as well (intercept), but stressed individuals were not informed that they would have the possibility to interact with their partner after the TSST (without investigators being present). Therefore, partner's support could not be anticipated during stress induction.

Level-2 predictors were then entered together in a model estimating a *full model* (model 4) including main and interaction effects of attachment and support scales. However, as this full model contains many parameters, we estimated a more parsimonious *final model* (model 5) including only significant effects (and the required non significant main effects to test interaction effects, Aiken & West, 1991). We interpret only these final models.

Results

Table 3 reports means, standard deviations, and correlations among predictors. Stressed women reported higher attachment anxiety levels than stressed men $t(121) = 3.87$, $p < .001$; but they did not differ in attachment avoidance $t(121) = .177$, $p = .177$; or baseline cortisol levels measured before stress induction $t(121) = -1.20$, $p = .234$. Attachment anxiety and avoidance significantly correlated in stressed women ($r = .35$, $p = .006$), but not in stressed men.

The dyadic interaction following stress induction (TSST) was characterized by a higher amount of positive ($M = 47.2$ resp. 38.8) than negative support ($M = 4.1$ resp. 2.0). Compared to female partners, male partners provided more positive $t(121) = 2.35$, $p = .021$; and negative support behaviors $t(121) = 2.16$, $p = .033$. Male partners who were observed to be more positive in their support behavior were also less negative ($r = -.31$, $p = .013$). The higher the stressed men's attachment anxiety, the more positive support provided female partners ($r = .32$, $p = .013$). Levels in attachment avoidance of stressed individuals were not associated with support providers' amount of positive or negative support[10].

[10] Support provider's own attachment characteristics were not in the center of interest. However, attachment anxiety and avoidance of female and male support providers were unrelated to their amount of total positive and total negative support behaviors, with the exception that male partners' avoidance was significantly related to the amount of negative support ($r = .30$; $p = .017$). For more detailed effects of attachment anxiety and avoidance on different forms of support providing as well as support seeking behaviors, see next chapter 4.3 (Study 2).

Table 3: Means, standard deviations, and correlations for predictors

	stressed women		stressed men		*gender difference*	*correlations*				
	M	*SD*	*M*	*SD*	*t*	anxiety	avoidance	positive support	negative support	baseline cortisol
anxiety	3.43	.94	2.83	.80	3.87 ***		.18	.32 *	-.15	.15
avoidance	2.22	.64	2.38	.72	-1.36	.35 **		.02	-.03	-.25 a
partner's positive support	47.20	21.61	38.76	17.80	2.35 *	.03	.08		-.09	-.08
partner's negative support	4.11	6.19	2.02	4.34	2.16 *	.03	.09	-.31 *		.14
baseline cortisol	6.57	4.79	7.64	5.11	-1.20	.12	.17	-.15	.07	

Note. Correlations for stressed women are below the diagonal; correlations for stressed men are above the diagonal. ** $p < .01$ * $p < .05$; a $p < .10$

Women's stress recovery

Women's cortisol levels decreased over time; adding a time effect explained 88% of the variance on level-1 (ICC = .78). There was considerable variation in the slope of women's stress recovery (significant improvement of deviance in estimation after including a random slope: $X^2(2) = 253.23$, $p > .001$). Intake of oral contraceptives (OC) and baseline cortisol levels were significantly associated with the intercept and the slope of cortisol measures (cf. base model). Consequently, we included these control variables in all subsequent models estimating women's cortisol levels. Estimations of different models are presented in Table 4.

Male partners' positive support, but not negative support, was related to the slope of estimated cortisol levels for stressed women (B = -.002, SE = .001, t = -2.85, p = .007). The more positive support stressed women received from the partner, the faster they recovered from stress. However, attachment anxiety moderated this effect (B = .001, SE < .001, t = 2.97, p = .005). Higher levels in attachment anxiety were related to a less pronounced stress recovery for positive support (the accelerating effect of positive support in the slope is reduced by the positive interaction effect). Additionally, higher levels in attachment anxiety were related to a decreased intercept (B = -2.267, SE = .700, t = -3.24, p = .002) representing a less pronounced stress reactivity. Attachment avoidance, on the other hand, was not related to the intercept and, contrary to our expectations, to the slope in cortisol stress levels. Therefore, attachment avoidance as well as negative support was excluded in the final model. Overall, level-2 predictors in the final model (positive support, attachment anxiety, baseline cortisol, and OC) explained 39% of the variance (*Pseudo-*R^2) in the slope of stressed women's cortisol levels.

To conclude, the more positive support was observed in male partners, the faster women recovered from stress. This effect was, as expected, moderated by women's anxiety: highly

anxious women benefitted less from partner's positive support regarding cortisol stress recovery.

Men's stress recovery

Men's cortisol levels decreased over time; adding a time effect explained 91% of the variance on level-1 (ICC = .58). There was considerable variation in the slope of men's stress recovery (significant improvement of deviance in estimation after including a random slope: $X^2(2) = 411.51$, $p > .001$). In line with stressed women, men's baseline cortisol level was significantly associated with the intercept and the slope of estimated cortisol levels; we controlled for this effect in all subsequent models. Estimated models for stressed men are presented in Table 5.

Men's cortisol levels were only associated with positive (B = -.001, SE < .001, $t = -2.20$, $p = .032$), but not with negative support of female partners. In line with stressed women, stressed men recovered faster from stress, the more positive support they received from the partner. Attachment anxiety and avoidance were, contrary to our expectations, not related to cortisol levels. Overall, level-2 predictors in the final model (positive support and baseline cortisol) explained 32% of the variance in the slope of stressed men's cortisol levels (*Pseudo-*R^2).

To conclude, men recovered faster from stress the more positive support they received from their female partners. Men's attachment anxiety and avoidance were not related to estimated cortisol levels.

Table 4: Cortisol stress recovery for stressed women (fixed effects with robust standard errors)

		base model			*dyadic coping*			*attachment*			*full model*			*final model*		
		B	(SE)		B	(SE)		B	(SE)		B	(SE)		B	(SE)	
Intercept (peak)	π_0															
intercept	β_{00}	14.052	(1.099)	***	14.052	(1.099)	***	13.982	(1.007)	***	13.982	(1.007)	***	14.015	(1.041)	***
baseline cortisol	β_{01}	.690	(.194)	***	.690	(.194)	***	.705	(.218)	**	.705	(.218)	**	.741	(.211)	**
OC	β_{02}	-4.627	(2.200)	*	-4.627	(2.200)	*	-4.143	(1.994)	*	-4.143	(1.994)	*	-4.369	(2.077)	*
anxiety	β_{03}							-2.709	(.733)	***	-2.709	(.733)	***	-2.267	(.700)	**
avoidance	β_{04}							1.960	(1.856)		1.960	(1.856)				
Time slope (recovery)	$\pi 1$															
intercept	β_{10}	-.136	(.015)	***	-.135	(.015)	***	-.135	(.014)	***	-.135	(.013)	***	-.135	(.014)	***
baseline cortisol	β_{11}	-.004	(.002)	*	-.004	(.002)	*	-.004	(.002)	a	-.004	(.002)	a	-.005	(.002)	*
OC	β_{12}	.130	(.029)	***	.127	(.029)	***	.125	(.028)	***	.123	(.027)	***	.127	(.028)	***
anxiety	β_{13}							.026	(.010)	*	.008	(.013)		-.002	(.011)	
avoidance	β_{14}							-.022	(.024)		-.045	(.031)				
positive support	β_{15}				-.000	(.000)					-.002	(.001)	**	-.002	(.001)	**
negative support	β_{16}				-.001	(.001)					-.002	(.004)				
anxiety x pos. supp.	β_{17}										.001	(.000)	a	.001	(.000)	**
anxiety x neg. supp.	β_{18}										-.000	(.001)				
avoidance x pos. supp.	β_{19}										.000	(.000)				
avoidance x neg. supp.	β_{110}										.001	(.001)				

Note. Time was coded in minutes; the intercept represents t_0. Cortisol is measured in nmol/L. $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$

Table 5: Cortisol stress recovery for stressed men (fixed effects with robust standard errors)

		base model			*dyadic coping*			*attachment*			*final model*		
		B	(SE)		B	(SE)		B	(SE)		B	(SE)	
Intercept (peak)	π_0												
intercept	β_{00}	22.035	(1.216)	***	22.035	(1.216)	***	22.035	(1.201)	***	22.035	(1.216)	***
baseline cortisol	β_{01}	1.643	(.257)	***	1.643	(.257)	***	1.596	(.263)	***	1.643	(.257)	***
anxiety	β_{03}							-1.887	(1.429)				
avoidance	β_{04}							-.075	(1.472)				
Time slope (recovery)	π_1												
intercept	β_{10}	-.301	(.021)	***	-.301	(.021)	***	-.301	(.021)	***	-.301	(.021)	***
baseline cortisol	β_{11}	-.021	(.006)	***	-.021	(.006)	***	-.020	(.006)	***	-.021	(.006)	***
anxiety	β_{13}							.013	(.023)				
avoidance	β_{14}							.016	(.027)				
positive support	β_{15}				-.001	(.000)	*				-.001	(.000)	*
negative support	β_{16}				.000	(.002)							
anxiety x pos. supp.	β_{17}												
anxiety x neg. supp.	β_{18}												
avoidance x pos. supp.	β_{19}												
avoidance x neg. supp.	β_{110}												

Note. Time was coded in minutes; the intercept represents t_0. Cortisol is measured in nmol/L. Models include no β_{02} and β_{12} parameter as there was no control for oral contraception for men. $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$

Discussion

The goal of the current experimental study was to examine whether, according to stress buffering effects of support in stress reactivity, positive support from the partner *following* a stressful situation would enhance physiological *stress recovery*. Attachment anxiety and avoidance were hypothesized to moderate the effect of partner support. In order to test these hypotheses, we triggered dyadic coping processes in couples by inducing stress in either the woman or the man of 123 heterosexual couples. Following the Trier Social Stress Test (TSST; Kirschbaum et al., 1993), a standard extradyadic stressor, couples were left alone and had the possibility to interact with each other. This interaction was videotaped and partners' behaviors were subsequently coded with regard to positive and negative support.

As expected, positive partner support had an accelerating effect on physiological stress recovery. Cortisol levels of stressed women and men diminished faster, the more positive support they received from the partner in the interaction following the TSST (controlled for baseline cortisol levels). This enhancing effect of partner's positive support enlarges previous findings showing a stress buffering effect of social support prior to stress induction (e.g., Ditzen et al., 2007; Kirschbaum, Klauer et al., 1995). Partner support may, therefore, not only have benefits for stress reactivity; it may also improve stress recovery.

In our study, partner's negative support was surprisingly not associated with stress recovery. However, only few partners were observed to provide any negative form of support. One should, therefore, not interpret this result as an indicator that negative behavior of the partner would have no effect on cortisol stress recovery. Several studies have shown a detrimental effect of negative couple interaction on partner's well-being (for an overview, see Proulx et al., 2007; and Robles & Kiecolt-Glaser, 2003).

The effect of partner's support on stress recovery was further hypothesized to be moderated by attachment anxiety and avoidance. As expected, the effect of partner's positive support on stress recovery was moderated by attachment anxiety, but only in women. Stressed women who reported higher levels in attachment anxiety benefited less from partner's positive support following the TSST. Their cortisol levels remained longer on an elevated level compared to low anxious women receiving the same amount of positive support.

The reason why this moderation effect of attachment anxiety was not significant for stressed men needs further exploration. One possible explanation could be that men reported overall lower levels in attachment anxiety than women. Furthermore, stressed men received more positive support from their female partners, the higher their self-reported attachment anxiety (positive correlation of independent variables). Stressed women's anxiety, on the other hand, was unrelated to male partner's support behavior. A study by Neff and Karney (2005) offers evidence that female partners are more sensitive in their supportive behavior than male partners. However, attachment anxiety and avoidance were not considered in their study. Studies focusing on gender specific effects of adult attachment on relationship functioning and partner's well-being are still underrepresented.

Surprisingly, women's attachment anxiety was also negatively associated with stress reactivity. The higher women's self-reported anxiety, the lower was their peak in stress reaction (estimated intercept). The difference in cortisol measures before and after stress induction was, therefore, smaller for highly anxious women compared to low anxious women. This main effect for women's anxiety as well as the moderation effect seems to be robust; they remained significant even after controlling for neuroticism. In contrast to our finding, Quirin, Pruessner, and Kuhl (2008) reported a stronger stress reaction for high anxious women (median split) measured 25 minutes following a laboratory stress task. However, in contrast to our study, women's romantic partner was not present throughout the experiment

and the stressor included no social evaluation (repeated exposure to unpredictable and uncontrollable noise). In line with the main effect for women's attachment anxiety, Shirotuski et al. (2009) found a weaker stress response after the TSST for highly social anxious men in comparison to low anxious men of a non clinical sample. Social anxiety was assessed by the brief fear of negative evaluation scale, which accents the fear of being rejected by someone similar to attachment anxiety. In line with our study, in which the partner was also coming to the lab but not present during different tasks, Diamond, Hicks, and Otter-Henderson (2006) found for anxious individuals a weaker reaction in skin-conductance, an indicator for sympathetic stress response, after an anger and speech task. The speech task was very similar to the mock job interview of the TSST. Interestingly, high avoidance was related to stronger sympathetic stress response during these tasks as well as during a math and two relationship related tasks.

In our study, we also expected a moderation effect of attachment avoidance. But avoidance did not interact with the effect of partner support on stressed individuals' recovery from stress. Additionally, avoidance had no main effect on the recovery rate (slope) or the stress level after the TSST (intercept). Highly avoidant individuals did, therefore, not differ from low avoidant individuals in their benefit from partner's positive support. One possible interpretation is that even though a highly avoidant individual seeks autonomy and avoids intimacy—and therefore experiences support from the partner as less positive (e.g., Campbell et al., 2005)—his or her need for intimacy may, nonetheless, be fulfilled by partner's support. The fulfillment of his or her needs may be equal to a securely attached individual, although their attachment goals are different. This idea finds support by a finding of Simpson, Rholes, and Nelligan (1992). In their study, more secure as well as more avoidant women were observed being able to calm down better, the more supportive their partner were in the interaction observed prior to an anxiety provoking task.

Nonetheless, the absent moderation effect of attachment avoidance as well as the moderation effect of attachment anxiety limited to women could also be specific to our research design as we triggered support only *following* the stress induction. There is need for replication and more studies need to focus on stress recovery processes. It may also be clarified if negative perceptions of support and its effect on health could—at least in women—be linked to the pattern presented in the study by Collins and Feeney (2004). In their study, anxiety was, in line with our finding, related to a negative perception of partner support *following* a stressful task (speech), while avoidance was relevant for a negative perception of support *prior* to the speech. However, also Gallo and Smith (2001) found stronger associations for attachment anxiety and negative perceptions of dyadic interactions than for attachment avoidance. It could also be possible that attachment anxiety has stronger effects on negative perceptions of dyadic interactions what could explain the moderation effect of women's attachment anxiety.

Our study has some limitations. One could argue that the accelerating effect of positive support in stress recovery could be specific to our sample with mainly satisfied partners whose behavior was characterized by infrequent negative support. However, testing an alternative model with relationship satisfaction as the only predictor of the intercept and slope of women's and men's stress recovery revealed no significant effects (beside control variables).

When interpreting our findings, one also has to consider that attachment anxiety and avoidance were measured on continuous dimensions. They do not represent clinically relevant measures of anxiety or avoidance. However, we assume that the moderation effect of attachment anxiety may be even stronger for clinically relevant levels; and that estimated effects for attachment avoidance could be underestimated. Furthermore, Collins, Ford,

Guichard, and Allard (2006) found that elevated negative attributions for hypothetical partner behavior were more pronounced for highly anxious individuals in unsatisfied relationships.

The stress induction by the Trier Social Stress Test (Kirschbaum et al., 1993) represents a standardized short-term laboratory stress. It is therefore unclear how relevant the findings are for an everyday stress and its recovery. Nonetheless, it is known, that inefficient recovery is related to disorders (de Kloet et al., 2005; McEwen, 2000). The involved mechanisms for an accelerating effect of positive partner support still need to be clarified. It may be that the constant appraisal process according to Lazarus may be influenced by receiving positive support from the partner. An initially perceived threat may faster be perceived as a controllable situation. According to Dickerson and Kemeny (2004), controllability is a central characteristic of a situation for cortisol reaction. Could dysfunctional cognitions of highly anxious women inhibit an adequate adaptation to the situation (e.g., fear of showing themselves vulnerable following the stressful tasks, searching for negative cues in the support of the partner) and impair the natural negative feedback system to recover from elevated cortisol levels? Such possible mediating effects and the search for biological correlates need further investigations. However, the moderation effect of attachment anxiety fits to the Biopsychosocial Model of Attachment for Disease presented by Maunder and Hunter (2001). This model underlines the interplay between cognitions, physiological stress reactions, and the buffering effect of social support. This study could enlarge the model for stress recovery, and adds an important finding including different empirical methods such as physiological stress measures, observed behavior, and self-report data.

4.3 The role of attachment in the process of dyadic coping: Stress communication and support provision (STUDY 2)

The role of attachment in the process of dyadic coping:

An experimental study[11]

Abstract

Adult attachment is supposed to underlie the same mechanisms as in childhood. Relying on the partner when stressed is a characteristic of secure attachment. Insecure attachment was hypothesized to be associated with specific behaviors in seeking and providing support. The goal of the present study was to trigger dyadic coping in order to examine differential effects of attachment anxiety and avoidance in the dyadic coping process following stress. Therefore, we experimentally induced extradyadic stress in (1) the woman, (2) the man, or (3) each of the partners of N =189 heterosexual couples. Observed forms of stress communication and support behaviors were coded and differentiated in their emotional range. If one partner was stressed, women expressed more stress than men, but they did not perceive more stress than men. Highly anxious women communicated more stress on a superficial level and provided less emotion-focused support. Higher levels in attachment anxiety in men, on the other hand, were related to increased emotion-focused support behavior, while high levels in avoidance were related to decreased nonverbal and increased negative support. If both partners were stressed, effects of attachment on the dyadic coping process were different. Contrary to expectations, avoidance was not related to emotion-focused stress communication and support in any experimental condition. Implications for couple interventions are discussed.

Keywords: dyadic coping, extradyadic stress, attachment, experimental study

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Introduction

The negative impact of stress on physical and mental health is widely recognized. Social support, on the other hand, can buffer this negative effect and alleviate its impact on general well-being (e.g., Dehle et al., 2001; Uchino, 2006). As support from the romantic partner is a major source of support (Bodenmann, 2005; Coyne & DeLongis, 1986), being in a satisfying close relationship is especially relevant for an individual's well-being (for reviews, see Bodenmann, 2005; Cutrona, 1996; Proulx et al., 2007; Robles & Kiecolt-Glaser, 2003).

Beside the positive effect of being in a close relationship, stress originating from outside the relationship (e.g., stress experienced at the workplace) has the potential to become a trigger for conflicts between partners at home. Stressed individuals communicate less successfully; they become more withdrawn or irritable what increases the likelihood of mutual negativity and escalation (e.g., Bodenmann, 2000; Bodenmann, Meuwly et al., 2010; Repetti, 1989; Schulz et al., 2004; Story & Repetti, 2006). Such a spillover of extradyadic stress on couples functioning is harmful for relationship quality and stability (e.g., Bodenmann & Cina, 2006). In order to detect a negative spillover effect of extradyadic stress on close relationships, a systematic examination of different types of stress (extradyadic vs. intradyadic stress) is required for research with couples (Karney et al., 2005; Randall & Bodenmann, 2009).

Support from the partner (i.e., dyadic coping) is especially important in the context of extradyadic stress when the partner himself or herself is not the source of stress. The partner can be more empathic, and is usually motivationally and emotionally more prone to provide support, since the origin of stress is independent from him or her (e.g., Bodenmann & Cina, 2006; Cutrona, 1996; Neff & Karney, 2004). Dyadic coping is not limited to partner's stress reduction; it increases trust and intimacy between partners, and enhances relationship quality

and partners' well-being (e.g., Bodenmann & Cina, 2006; Bodenmann et al., in press; Coyne & Smith, 1991; Randall & Bodenmann, 2009; Uchino, 2006).

A systematic examination of dyadic coping process may facilitate the identification of relevant individual variables such as attachment anxiety and avoidance. The goal of the current study was, therefore, to examine dyadic coping process with regard to attachment. In order to increase internal validity, we experimentally induced extradyadic stress and systematically observed the dyadic coping process.

The process of dyadic coping

Dyadic coping is conceptualized as a circular interpersonal process in which partner A communicates his or her stress, which is perceived and decoded by partner B's, and responded to by coping reactions (e.g., Badr & Acitelli, 2005; Bodenmann, 1995b; Bodenmann, 2005; Cutrona et al., 2005). In the context of attachment, especially the emotional range of the dyadic coping process is of particular interest. According to Bodenmann (1997), stress can be expressed in a rather superficial way by describing neutrally what happened, expressing stress nonverbally, or asking partner B for advice or assistance (problem-focused stress communication). More information about the emotional state of the stressed individual is disclosed in implicit and explicit emotion-focused stress communication; but only in explicit stress communication partner A clearly signals the need for emotional support by mentioning a specific emotion (e.g., "I feel ashamed", "This makes me sad"). In line with the emotional range of stress communication, categories of support within a supportive dyadic coping process can be distinguished with regard to its practical or emotional content. Emotion-focused support includes all forms of verbal support aiming to help the partner to calm down such as empathic understanding, showing solidarity with the partner, or encouraging the partner. Other positive forms of support are nonverbal support (e.g., holding, kissing, hugging), or listening attentively to the partner and showing interest as

a form of positive reinforcement. Problem-focused support, on the other hand, includes reactions to partner asking for advices or information. Problem-focused support aims to alter the stressful characteristics of a situation. Negative support, on the other hand, includes hostile behavior or insensitive support providing (e.g., ignoring a partner's stress communication, making fun of a partner's feeling, diminishing a partner's experience).

Support provision is most effective when it fits the emotional needs of the stressed partner (e.g., Bodenmann, 2007, 2009; Cutrona et al., 2007). Emotion-focused stress communication should be answered by emotion-focused support instead of problem-focused support; the partner was perceived as being most sensitive in this case in a study by Cutrona et al. (2007). Problem-focused support is appropriate when the partner talks about his or her stress in a factual way or asks for advice. Furthermore, explicit emotion-focused stress communication (or deepened emotional self-disclosure) facilitate partners' emotional understanding and allows him or her to provide support more adequately (Bodenmann, 2007).

The Concept of Attachment

The process of seeking and providing support is closely linked to one's attachment style. According to Bowlby (1973), first experiences with primary caregivers, how they respond to one's need in times of distress, are internalized and shape an inner working model of interpersonal relationships. This inner working model comprehends mental representations of the self with its worthiness of love, and of others as a source of support in times of need. Secure attachment is characterized by positive representations of the self and others as a responsive and reliable source of support. Insecure attachment, on the other hand, is characterized by negative representations of others as unreliable source of support (Bowlby, 1973).

Even though attachment has its origin in childhood, it still has an impact on interpersonal relationships of an adult's life (Bowlby, 1980). In adulthood, possible attachment figures are parents, siblings, close friends, and, of particular interest, the romantic partner. Hazan and Shaver (1987) were the first describing love as an attachment process. They assumed that adult romantic relationships underlie the same biological system as infant-caregiver relationships. According to attachment types in childhood (Ainsworth et al., 1978), they reformulated Ainsworth's secure, avoidant, and ambivalent-anxious attachment types for adult romantic relationships and used these types as a self-report measure. Bartholomew (1990; Bartholomew & Horrowitz, 1991) later added a forth attachment type for close relationships. Based on Bowlby's description of the inner working model, she suggested a four-group model by combining positive and negative mental models about the self (worthy vs. unworthy of love) and about the other (responsive vs. rejecting). She divided Hazan and Shaver's (1987) avoidant style into two groups, the dismissive-avoidant (characterized by a negative model of others and a positive model of the self) and the fearful-avoidant group (characterized by a negative model of others and a negative model of the self).

Although the, historically predominant, categorical approach of attachment types offers a practical framework for research and interventions, there is growing evidence that attachment is better represented by a dimensional approach; and that one should avoid creating categories in order to retain information about individual variances and improve statistical power (Fraley & Waller, 1998). According to Brennan, Clark, and Shaver (1998), attachment is best represented by two orthogonal dimensions: anxiety and avoidance. Attachment anxiety reflects the degree of worrying about being unloved and abandoned. High levels in anxiety are related to the tendency to deal with distress by hyperactivating the attachment system to win others love and affection. Attachment avoidance, in contrast, is related to the tendency to deactivate the attachment system when distressed. Avoidance reflects the degree of

discomfort with intimacy and dependence on others. Low levels in attachment anxiety and avoidance reflect secure attachment (e.g., Brennan et al., 1998; Mikulincer & Shaver, 2003).

Attachment and dyadic coping

Attachment behavior is activated, when an individual perceives stress or a threat. Relying on the partner as a safe haven is one characteristic of an attachment relationship (Bowlby, 1973; Hazan & Shaver, 1987). In contrast to adult-child dyads, the process of seeking and providing support between romantic partners is supposed to be reciprocal and symmetric; both partners are interchangeably in the role of a care seeker and a care provider. In line with findings in childhood, insecurely attached individuals are expected to have more dysfunctional cognitions and emotions about care givers, in this case the partner (Bowlby, 1973; Hazan & Shaver, 1987).

Several studies confirm that insecurely attached individuals tend to underestimate the availability of their partner as a source of support and to be less satisfied with the support they receive (e.g., Bodenmann, 2000; Cobb, Davila, & Bradbury, 2001; Collins & Feeney, 2004). As a result, they and their partners report lower levels in relationship satisfaction (e.g., Campbell et al., 2005; J. A. Feeney, 2002; Saavedra, Chapman, & Rogge, 2010). However, insecure attachment is not only related to dysfunctional cognitions regarding support processes, it is also related to dysfunctional behavior in activating the attachment system (Bowlby, 1973; Hazan & Shaver, 1987; Mikulincer & Shaver, 2003).

a) Relying on the partner as a safe haven: Support seeking

Previous observational and daily-diary studies confirm that securely attached individuals seek more support when facing an extradyadic stress (e.g., Collins & Feeney, 2000; Davila & Kashy, 2009; Simpson et al., 1992). It is supposed that they feel more comfortable with exposing their needs and receiving support. However, attachment anxiety was unrelated to

self-reported and observed support seeking behavior (e.g., Bradford et al., 2002; Collins & Feeney, 2000; Simpson et al., 1992; Simpson, Rholes, Orina, & Grich, 2002). In the study by Simpson et al. (1992), women who were rated by external observers to be more anxious and fearful in the interactions with their partners expressed their feelings more extensively. Attachment avoidance, on the other hand, was associated with less support seeking in line with their attachment goals (e.g., Collins & Feeney, 2000; Simpson et al., 1992). This could explain the effect of less perceived support in highly avoidant individuals (Davila & Kashy, 2009). In a study by Collins and Feeney (2000), highly avoidant individuals used more ineffective support seeking strategies while disclosing a personal problem (e.g., showing negative affect, offer hints without mentioning the specific problem). However, authors did not examine different forms of emotional disclosure (global ratings in which extent emotional disclosure were present including nonverbal behavior).

b) Offering a safe haven for the partner: Support providing

One's inner working model also influences one's behavior as a support provider. Securely attached individuals are more comfortable with providing support in comparison to insecurely attached individuals (e.g., Davila & Kashy, 2009; Simpson et al., 1992). In previous studies, highly anxious individuals tended to be overinvolved in support providing, what resulted in lower support quality. They were less sensitive, and more obsessive and controlling in their support behaviors (e.g., Collins & Feeney, 2000; Davila & Kashy, 2009; B. C. Feeney & Collins, 2001). Highly avoidant individuals, on the other hand, established distance to their partner by being less supportive and emotional responsive (Simpson et al., 1992; Simpson et al., 2002); their support was characterized by a lack of trust and more controlling behavior (B. C. Feeney & Collins, 2001).

The current study

We assumed that partners' attachment anxiety and attachment avoidance levels would have an impact on the emotional range of the dyadic coping process. Overall, more secure individuals were expected to seek and provide support more adequately.

Although anxiety was in most studies unrelated to support seeking behavior (ratings of support seeking were mostly conducted on a global level and rarely distinguished in its emotional range for analysis), highly anxious individuals were expected to express more emotions while seeking support in order to hyperactivate the support system (positive association between attachment anxiety and emotion-focused SC). Highly avoidant individuals, on the other hand, were expected to express fewer emotions while seeking support (negative association between attachment avoidance and emotion-focused SC). If they would express stress, they might communicate in a more superficial manner such as problem-focused, nonverbal, or neutral SC.

Furthermore, secure individuals were expected to be more sensitive and responsive when providing support. In line with previous studies (B. C. Feeney & Collins, 2001; Simpson et al., 1992; Simpson et al., 2002), we expected for highly avoidant support providers to provide less emotion-focused and nonverbal support; two forms of support that would create emotional or physical intimacy. High levels in attachment anxiety, on the other hand, were hypothesized to result in poorer support quality characterized by less emotion-focused and more negative support behavior.

We had no specific hypothesis for gender as the distinction of different forms of SC and support was relatively novel. Because a couples' everyday life includes many situations where both partners are stressed, we were also interested in the particular situation when both partners are stressed, thus seeking and providing support at the same time.

In order to test these hypotheses, either the woman (experimental condition 1), the man (experimental condition 2), or both of the partners were stressed (experimental condition 3) by means of the Trier Social Stress Test (TSST; Kirschbaum et al., 1993) in order to trigger and observe the dyadic coping process in couples. The combination of social evaluation and uncontrollability within the TSST has been shown to be an effective way to induce stress experimentally (for an overview, see Dickerson & Kemeny, 2004).

Method

Sample

Couples were recruited by distributing flyers and advertising information on internet platforms and in newspapers. All couples had to meet the following inclusion criteria: (a) willingness of both partners to participate, (b) exclusively dating since at least 12 months, and (c) both partners aged between 20 and 45 years. Additionally, both partners had to communicate in German for reasons of behavioral data analysis. Exclusion criteria for participation were chronic mental or physical illness, medication and former participation in the TSST (cf. Schommer et al., 2003).

198 heterosexual couples participated in the current study. Nine couples had to be excluded for data analysis for the following reasons: seven couples were not talking German during the observed interaction (as a result videotapes could not be coded), one couple provided insufficient compliance during the experiment, and in one couple the male partner was on medication (antidepressant). The final sample size was N = 189 couples with 64 couples in the first (woman stressed), 63 couples in the second (man stressed), and 62 couples in the third experimental condition (both partners stressed). Mean age for women was 26.4 years (SD = 5.7) and for men 28.5 years (SD = 6.3). Most participants (56% of women and

40% of men) were still in continuous education, mostly at university. Only one third of female and one fifth of male participants did not work at the time of the study. Half of the couples were cohabitating, although only 17% were married. Most of the couples had no children (87%). Relationship duration ranged from one year to 25 years (M = 4.2, SD = 3.7). The majority of partners were satisfied with their relationship (M = 4.4; SD = 0.4) (RAS-scale ranging from 1 to 5; Hendrick, 1988). Couples in different experimental conditions did not differ with regard to these demographic characteristics ($F \leq 1.601$, $p \geq .208$).

Procedure

Overview. Couples were examined in our labs at the University of Fribourg (20% of the experiments) and the University of Zurich. The main experimental room was equipped with a couch and two tables with a computer for each partner. Stress induction was conducted in separate rooms. Couples were randomly assigned to three different experimental conditions: Either the woman (experimental condition 1), the man (experimental condition 2), or each of the partners was stressed (experimental condition 3) with the TSST. Couples were not aware of alternative experimental conditions. Experiments lasted 120 to 150 minutes depending on how long partners needed to fill out the questionnaires.

Introduction. The two investigators first gave a brief introduction to the study and different measures in a non-threatening and non-stressful manner. Both partners signed informed consent, before they completed a first set of questionnaires each on a separate computer.

Stress induction (Trier Social Stress Test; Kirschbaum et al., 1993). The investigator guided the partner who had to participate in the TSST into a second room. The TSST audience, consisting of one woman and one man dressed in a white coat, was seated behind a table and waited for the participant. A video camera on the left side of the table was directly

pointing to the participant. During the first contact with the participant, the audience was not talking at all. The investigator gave a brief introduction to the participant (reading it aloud to standardize the procedure). After this first introduction, the participant was guided into a third room, where he or she had time to prepare individually for the mock job interview. After 5 minutes, the investigator guided the participant back into the TSST room and gave a second introduction. Participants were told that members of the audience were experts in nonverbal behavior analysis, and that participants had another—not clearly defined—task to accomplish after the mock job interview. The investigator then left the room, and the woman from the audience asked the participant to start presenting himself. When the participant stopped talking, he or she was first prompted to continue his speech before standardized questions were asked (e.g., “Why do you think you should get this job?”; “What makes you more qualified than other candidates?”; “What is your opinion about team work?”). Reactions of the audience were brief, neutral and distant (all verbal guidance was done by the woman while the man had the role of a mute observer). The mock job interview lasted 4 minutes. After that time, the second task was introduced. Participants had to solve a cognitive task and were asked to continuously subtract the number 17 from 2043. Every time participants made a mistake, they had to restart at 2043. This second task lasted another 4 minutes, before the audience interrupted the participant and asked him or her to leave the room and rejoin investigators.

In the third experimental condition, both partners were independently guided by one of the two investigators into separate rooms with different TSST audiences. In the first and second experimental condition, the partner who was not assigned to the stress induction was asked to remain seated until their partner would come back. He or she had the possibility to read a magazine while waiting alone in the main room.

Support interaction. After the TSST, couples were reunited in the main room. They were then told that investigators had to "check if the job interview was recorded properly, so that the audience could start to analyze it". The couple was left alone for 8 minutes and the interaction was videotaped. There was no specific instruction that partners should support each other (unstructured interaction).

Debriefing. Finally, investigators returned to the couple and partners were asked to complete a second set of questionnaires. At the end of the experiment, couples received a detailed debriefing. Couples were paid a compensation of 100 Swiss francs (approx. 100 Dollars) for participation.

Measures

Observed Dyadic Coping behavior. Ratings of observed dyadic coping were based on the SEDC (System to assess dyadic coping [System zur Erfassung des dyadischen Copings]; Bodenmann, 1995a) evaluating A) *stress communication (SC)*: 1A) problem-focused SC (asking partner B for advice: e.g., "What could I have done in this situation?"), 2A) nonverbal SC (e.g., sighing, shaking one's head, sad gestures), 3A) neutral SC (description of what happened), 4A) implicit emotion-focused SC (e.g., "I felt like a fool."; "I was so nervous and stressed out."), 5) explicit emotion-focused SC (e.g., "This made me angry."; "I felt ashamed and worthless."), and B) *partner support (coping reaction)*: 1B) problem-focused support (also described as instrumental support), 2B) nonverbal support (e.g., holding, kissing, hugging), 3B) attention/interest: listening attentively to the partner and showing interest in the partner (e.g., by asking questions), 4B) emotion-focused support (all emotion-focused positive verbal support; e.g., empathic understanding, showing solidarity with the partner, encouraging the partner), and 5B) negative support (hostile, ambivalent or superficial support, including negative nonverbal behavior). SC and support were coded every 10 seconds (time sampling) by two independent coders; one coding woman's behavior, the other coding man's behavior.

Coders were not informed of the hypotheses of the study. Interrater-agreement was satisfying (10% of tapes coded by both observers): Cohens kappa for SC was $\kappa = .778$ and for support $\kappa = .869$. Variables represent relative frequencies (absolute frequency divided by number of codable intervals, and multiplied by 100) of different forms of SC and support during the 8-minute-interaction with the partner following the TSST.

Self-reported stress (after TSST). According to the stress emotion theory of Lazarus (1991), participants rated on a 5-point-likert scale how "stressed", "anxious", "distressed", "angry", "aggressive" and "sad" they felt at the current moment (1 = 'not at all' to 5 = 'very'). Internal consistency of this scale (average of different stress emotions) were $\alpha = .77$ for stressed women and $\alpha = .78$ for stressed men.

Attachment in close relationships. Attachment for romantic relationship (in general) was assessed by the Bochumer Bindungsfragebogen (Neumann et al., 2007) representing a validated German version of the Experience in Close Relationships scale (ECR) by Brennan et al. (1998). This questionnaire includes 36 items representing two continuous dimensions of attachment, namely anxiety and avoidance. Each item was rated on a 7-point-likert scale and then averaged for the two dimensions. Low measures of attachment anxiety and avoidance represent more secure attachment. Internal consistency of both scales were high for female (f) and male (m) partners (anxiety: $\alpha_f = .85$ / $\alpha_m = .80$; avoidance: $\alpha_f = .81$ / $\alpha_m = .83$).

Data Analysis

Distributions of relative frequencies of different forms of stress communication (SC) and support were positively skewed, zero-inflated, and over-dispersed (variance exceeded the mean). Therefore, the appliance of the general linear modeling was not appropriate. According to suggestions by Elhai, Calhoun, and Ford (2008), we estimated zero-inflated negative binomial regression models (see also Long, 1997). In contrast to the Poisson

regression model, the negative binomial model is appropriate for the estimation of over-dispersed count data. The following model was estimated for each count (separately for experimental conditions):

$$\hat{u} = \exp(b_0 + b_1\text{control variable} + b_2\text{anxiety} + b_3\text{avoidance}) = e^{b0} * e^{b1control} * e^{b2anx.} * e^{b3avoid.}$$

Effects of stressed partners' anxiety and avoidance on their amount of each SC form were controlled for their self-reported stress level after the TSST in order to eliminate variability of differences in experienced stress. Frequencies of support behaviors, on the other hand, were controlled for the amount of partner's stress communication of the stressed partner. Stress communication is a condition that the dyadic coping process is activated. Zero-inflated negative binomial regression models were estimated with M-Plus (Muthén & Muthén, 1998-2007). We report only unstandardized coefficients since data were zero-inflated and over-dispersed; the normal standard deviation would, therefore, not be adequate. For a 1-unit change in anxiety (as an example) the estimated count (SC or support behavior) is multiplied by e^{b2}, holding any other variable constant (Coxe, West, & Aiken, 2009). The estimated count is, therefore, increased for positive values of b ($b > 0 \Rightarrow e^b > 1$) and decreased for negative values ($b < 0 \Rightarrow e^b < 1$).

Results

Frequencies of observed stress communication and support behaviors

Table 6 presents means, standard deviations, and ranges for relative frequencies of observed stress communication (SC). Values represent the percentage of time stressed partners expressed a specific SC during the interaction with the partner following the TSST. Most SC for all stressed partners was neutral, describing to the partner what happened during

the TSST. All other SC forms were less frequent. A majority of stressed individuals were not communicating any problem-focused, nonverbal, implicit, or explicit SC resulting in zero-inflated distributions of SC forms, albeit with big ranges. As a result of very few explicit emotion-focused SC (less than 15% of stressed individuals mentioned a specific stress emotion), this category was combined with implicit emotion-focused SC in a new category labeled emotion-focused SC.

For the first two experimental conditions, where only one partner was stressed, stressed women were communicating more stress than stressed men (gender effects significant for all SC forms: $Z \geq 2.22$, $p \leq .026$). If both partners were stressed (experimental condition 3), only one gender difference in frequencies of SC was present: Women were talking longer about the stressful situation in a neutral way than men (neutral SC: $Z = 1.93$, $p = .054$). Partners in this third experimental condition expressed more problem-focused (group difference: $Z = 1.93$, $p = .054$ for stressed women; $Z = 4.17$, $p \leq .001$ for stressed men) and less neutral SC (group difference: $Z = 4.38$, $p \leq .001$ for stressed women; $Z = 3.33$, $p \leq .001$ for stressed men) in comparison to the conditions with only one stressed partner. Additionally, stressed women expressed more stress nonverbally, when only they were stressed (group difference: $Z = 2.24$, $p = .025$ for stressed women; not significant for stressed men). Relative frequencies of emotion-focused SC did not differ whether one or both partners were stressed (group difference not significant for stressed women and men).

Table 6: Relative frequencies of stress communication (SC) and support behaviors

	one partner stressed							both partners stressed (experimental condition 3)							*Group difference*	
	experimental condition 1			experimental condition 2			*gender diff.*	stressed women			stressed men			*gender diff.*	women	men
	M	*SD*	*Range*	*M*	*SD*	*Range*	*Z*	*M*	*SD*	*Range*	*M*	*SD*	*Range*	*Z*	*Z*	*Z*
SC:	*stressed women*			*stressed men*												
problem-focused	1.28	2.51	0-13	.51	1.29	0-6	2.22 *	2.34	4.25	0-27	1.82	2.31	0-9	.03	1.93 a	4.17 ***
nonverbal	2.61	4.08	0-21	1.40	2.67	0-13	2.39 *	1.18	1.85	0-9	1.21	1.87	0-9	.01	2.24 *	.44
neutral	43.39	16.33	16-81	34.21	13.24	0-69	2.97 **	29.89	12.05	0-52	26.05	11.34	0-52	1.93 a	4.38 ***	3.33 ***
emotion-focused	8.20	6.69	0-29	5.24	5.08	0-27	2.64 **	6.32	6.43	0-33	5.06	6.46	0-39	.95	1.78	.68
support:	*male partner*			*female partner*												
problem-focused	3.41	4.98	0-23	2.89	4.36	0-25	.77	3.66	3.38	0-11	4.16	5.50	0-33	.07	2.04 *	1.17
nonverbal	4.78	7.83	0-46	2.33	4.42	0-28	2.15 *	1.82	3.35	0-21	2.15	3.62	0-17	.46	.70	2.36 *
attention/ interest	30.48	14.72	8-81	27.78	12.06	4-64	.65	15.21	8.34	0-35	17.73	9.30	0-46	1.26	5.98 ***	5.42 ***
emotion-focused	8.81	7.74	0-36	5.19	6.00	0-29	3.16 **	2.53	4.07	0-17	3.63	4.35	0-19	1.79 a	3.25 **	4.51 ***
negative	4.00	6.17	0-29	1.98	4.29	0-25	2.18 *	1.58	5.80	0-37	1.55	4.80	0-29	.76	1.62	2.90 **

Note. Table shows integer values (possible range 0 to 100) of relative frequencies of observed stress communication (SC) and support behaviors in 8-minute-interaction following the TSST (rating every 10 seconds). *** $p < .001$; ** $p < .01$; * $p < .05$; a $p < .10$

As Table 6 also presents, most support was offered by partners through listening attentively to their stressed partner and showing interest, according to the high amount of neutral SC of stressed partners. Frequencies of observed support behaviors of female and male partners differed only, if they were not stressed by the TSST (experimental condition 1 and 2). Male partners' support was characterized by higher frequencies of nonverbal, emotion-focused, and negative support ($Z \geq 2.15$, $p \leq .032$) in comparison to female partners. In comparison to stressed partners in experimental condition 3, unstressed female and male partners were both more attentive and showing more interest in the partner (group difference: $Z = 5.98$, $p \leq .001$ for female partners; $Z = 5.42$, $p \leq .001$ for male partners), and provided more emotion-focused support (group difference: $Z = 3.25$, $p \leq .001$ for female partners; $Z = 4.51$, $p \leq .001$ for male partners). Additionally, unstressed male partners were supporting more nonverbally (group difference: $Z = 2.36$, $p = .018$ for male partners; not significant for female partners), but also more negatively (group difference: $Z = 2.90$, $p = .004$ for male partners; not significant for female partners). Female partners, on the other hand, provided more problem-focused support, if they were stressed simultaneously with their partner (group difference: $Z = 2.04$, $p = .042$ for female partners; not significant for male partners).

Overall, stressed partners communicated, as expected, more stress, the more stress they perceived (correlation ranging from .28 to .41 for all stressed partners, $p < .05$). Women reported on average higher attachment anxiety levels than men ($M_w = 3.38$, $SD_w = .94$ vs. $M_m = 2.96$, $SD_m = .75$; gender difference: $t = 4.60$, $p \leq .001$), while men reported higher avoidance levels than women ($M_w = 2.20$, $SD_w = .68$ vs. $M_m = 2.46$, $SD_m = .74$; gender difference: $t = 4.24$, $p \leq .001$). Attachment anxiety and avoidance correlated moderately in women ($r = .27$, $p \leq .001$; ranging from .15 to .35 in different experimental conditions), but not in men ($r = .13$, *ns*; ranging from .03 to .19 in different experimental conditions).

The role of attachment for the dyadic coping process: One partner stressed

For experimental conditions with only one stressed partner, stressed women and men did not differ in their perceived stress levels (t = 1.61, p = .109). Women's self-reported stress levels (experimental condition 1) were not associated with attachment anxiety (r = .15, *ns*) or avoidance (r = .18, *ns*). However, men's attachment anxiety (r = .27, p = .034), but not avoidance (r = .11, *ns*), was positively related to self-reported stress (experimental condition 2). Support providers attachment scales were not related to stressed partners total amount of SC (r ranging from -.13 to .11).

All estimated effects of stressed partners' attachment anxiety and avoidance on their stress communication were controlled for self-reported stress after the TSST (see

Table *7*). Stressed women expressed more nonverbal (Odds = 1.74) and emotion-focused SC (Odds = 1.59), the more stressed they perceived; while men expressed more problem-focused SC (Odds = 3.81). Women's attachment anxiety was a relevant predictor of all forms of women's stress communication, except neutral SC (p = .477). Higher levels in women's attachment anxiety were associated with more problem-focused (Odds = 1.65), more nonverbal (Odds = 1.39), and, contrary to our hypothesis, less emotion-focused SC (Odds = .83) in the interaction with the partner. For stressed men, on the other hand, attachment anxiety was not related to any form of SC behavior ($p \geq .219$). Contrary to our expectations, women's attachment avoidance was not a significant predictor of the frequency of emotion-focused SC (p = .268) or any other form of SC ($p \geq .435$). Stressed men, on the other hand, expressed more problem-focused SC (Odds = 1.61), the higher the level in self-reported avoidance. But men's emotion-focused SC was not, as expected, significantly associated with attachment avoidance (p = .720).

Support behaviors of unstressed male and female partner were estimated with regard to their own attachment scales; estimated effects were controlled for the total amount of partners SC. As

Table *7* (lower part) presents, all forms of support behaviors were more frequent the more stress the partner communicated. Highly anxious men (in experimental condition 1) provided less problem-focused support (Odds = .74) and, contrary to our expectation, more emotion-focused support (Odds = 1.20). High levels in men's avoidance, on the other hand, were associated with decreased nonverbal (Odds = .56) and increased negative support (Odds = 1.37); but not as expected with increased emotion-focused support (p = .356). For women's support behavior (experimental condition 2), avoidance was not related to any form of support behavior ($p \geq .284$). Contrary to our expectations, the quality of support provision was, therefore, comparable for women with high and low levels in attachment avoidance. Highly anxious women, on the other hand, provided less emotion-focused support (Odds = .75); but also less negative support (Odds = .56).

The role of attachment for the dyadic coping process: Both partners stressed

When both partners were stressed simultaneously (experimental condition 3), both partners were at the same time in the role of seeking and providing support in the interaction following the TSST. Perceived stress levels of both partners did not significantly differ in comparison to the condition with only one stressed partner (group difference: t = .03, p = .974 for women; t = .04, p = .969 for men). Women's and men's self-reported stress levels within this experimental condition were comparable (gender difference: t = 1.61, p = .112). Contradictory to the condition with only one stressed partner, women's and men's perceived stress was positively associated with attachment anxiety (women: r = .28, p = .027; men: r = .31, p = .016) and avoidance (women: r = .46, $p < .001$; men: r = .34, p = .007). The total

Table 7: Unstandardized estimates of zero-inflated negative binomial regression models

	experimental condition 1 (woman stressed)				experimental condition 2 (man stressed)				experimental condition 3 (both partners stressed)							
	B	(SE)		Odds	B	(SE)		Odds	B	(SE)		Odds	B	(SE)		Odds
Stress communication:	*stressed women*				*stressed men*				*stressed women*				*stressed men*			
DV: problem-focused SC																
self-reported stress	-.04	(.22)		.96	**1.34**	**(.33)**	***	**3.81**	.20	(.31)		1.22	**-.40**	**(.23)**	[a]	**.67**
anxiety	**.50**	**(.13)**	***	**1.65**	-.46	(.38)		.63	-.47	(.33)		.63	-.11	(.18)		.90
avoidance	.15	(.19)		1.16	**.48**	**(.24)**	*	**1.61**	.19	(.32)		1.21	.19	(.21)		1.21
DV: nonverbal SC																
self-reported stress	**.55**	**(.20)**	**	**1.74**	.26	(.33)		1.30	.15	(.20)		1.16	.14	(.13)		1.15
anxiety	**.33**	**(.15)**	*	**1.39**	.08	(.25)		1.08	.02	(.16)		1.02	**-.68**	**(.11)**	***	**.51**
avoidance	-.01	(.21)		.99	.29	(.30)		1.34	-.05	(.31)		.95	.24	(.28)		1.27
DV: neutral SC																
self-reported stress	.07	(.07)		1.07	.11	(.08)		1.12	**.24**	**(.05)**	***	**1.28**	**.19**	**(.10)**	[a]	**1.21**
anxiety	-.04	(.06)		.96	.05	(.06)		1.05	-.04	(.05)		.96	-.14	(.09)		.87
avoidance	.05	(.08)		1.05	-.07	(.05)		.93	**-.12**	**(.05)**	*	**.89**	**-.16**	**(.09)**	[a]	**.85**
DV: emotion-focused SC																
self-reported stress	**.46**	**(.11)**	***	**1.59**	.29	(.31)		1.34	**.63**	**(.20)**	**	**1.87**	**.61**	**(.24)**	*	**1.83**
anxiety	**-.18**	**(.08)**	*	**.83**	.12	(.18)		1.13	-.07	(.11)		.93	-.14	(.26)		.87
avoidance	.16	(.14)		1.17	-.07	(.18)		.94	-.21	(.14)		.81	-.03	(.25)		.98

Table to be continued

Table 7: Unstandardized estimates of zero-inflated negative binomial regression models (continued)

	exp. condition 1 (woman stressed)				exp. condition 2 (man stressed)				experimental condition 3 (both partners stressed)							
	B	(SE)		Odds	B	(SE)		Odds	B	(SE)		Odds	B	(SE)		Odds
Support:	*male partner*				*female partner*				*stressed women*				*stressed men*			
DV: problem-focused																
total SC partner	**.03**	**(.01)**	***	**1.03**	**.06**	**(.01)**	***	**1.06**	**.02**	**(.01)**	***	**1.02**	**.03**	**(.01)**	*	**1.03**
anxiety	**-.30**	**(.17)**	a	**.74**	.22	(.21)		1.25	.02	(.09)		1.02	.10	(.25)		1.11
avoidance	.04	(.16)		1.04	-.05	(.29)		.95	-.13	(.13)		.88	-.09	(.17)		.92
DV: nonverbal																
total SC partner	**.02**	**(.01)**	***	**1.02**	**.03**	**(.02)**	a	**1.03**	.03	(.02)		1.03	**.02**	**(.01)**	a	**1.02**
anxiety	.17	(.13)		1.18	.29	(.22)		1.33	-.45	(.29)		.64	-.01	(.25)		.99
avoidance	**-.57**	**(.14)**	***	**.56**	-.26	(.35)		.77	-.38	(.31)		.68	-.17	(.22)		.84
DV: attention/interest																
total SC partner	**.02**	**(.00)**	***	**1.02**	**.02**	**(.00)**	***	**1.02**	**.02**	**(.01)**	***	**1.02**	**.02**	**(.00)**	***	**1.02**
anxiety	-.04	(.05)		.96	.03	(.04)		1.03	-.07	(.09)		.93	-.01	(.09)		.99
avoidance	-.07	(.06)		.94	.05	(.05)		1.06	.03	(.10)		1.03	**-.13**	**(.07)**	a	**.88**
DV: emotion-focused																
total SC partner	**.02**	**(.00)**	***	**1.02**	**.03**	**(.01)**	***	**1.03**	.02	(.02)		1.02	**.03**	**(.01)**	***	**1.03**
anxiety	**.18**	**(.10)**	a	**1.20**	**-.29**	**(.13)**	*	**.75**	**-.32**	**(.19)**	*	**.73**	.28	(.19)		1.33
avoidance	-.10	(.10)		.91	-.01	(.27)		1.00	.16	(.26)		1.18	-.02	(.17)		.98
DV: negative																
total SC partner	**.02**	**(.01)**	*	**1.02**	**.04**	**(.02)**	*	**1.04**	**.14**	**(.03)**	***	**1.15**	**.05**	**(.01)**	***	**1.05**
anxiety	.20	(.18)		1.23	**-.58**	**(.18)**	***	**.56**	.38	(.39)		1.46	**.74**	**(.25)**	**	**2.10**
avoidance	**.31**	**(.11)**	**	**1.37**	.23	(.37)		1.25	**-2.58**	**(.71)**	***	**.08**	-.09	(.31)		.91

Note. DV = dependent variable; SC = stress communication; Odds = e^b. Significant effects are printed in bold. *** $p < .001$; ** $p < .01$; * $p < .05$; a $p < .10$

amount of partners' SC was unrelated to support providers' attachment anxiety and avoidance (r ranging from -.12 to .07).

In contrast to other experimental conditions with only one stressed partner, attachment anxiety was not a relevant predictor of any form of SC for both partners ($p \geq .152$), beside men's nonverbal SC (Odds = .51). Highly anxious men were, therefore, less likely to express stress nonverbally. Attachment avoidance, on the other hand, was associated with the frequency of neutral SC. Highly avoidant women and men expressed less neutral SC. This effect was significant for stressed women ($p = .025$, Odds = .89), but only marginally significant for stressed men ($p = .088$, Odds = .85). In sum, hypothesized associations for emotion-focused SC with attachment anxiety (positive association) and avoidance (negative association) were not confirmed when both partners were stressed.

Support providers' attachment anxiety and avoidance were expected to be associated with the quality of support provision. Highly avoidant men were observed to be less attentive and to show less interest in the interaction with their female partners (Odds = .88), while highly anxious men provided, as expected, more negative support (Odds = 2.10). Highly anxious women, on the other hand, provided less emotion-focused support (Odds = .73) in the interaction with their partner. This effect was also present for unstressed female partners. Surprisingly, the frequency of negative support was negatively associated with women's attachment avoidance (Odds = .08). Highly avoidant women were, therefore, very unlikely to be negative in their support behavior. In sum, when both partners were stressed, highly avoidant partners did not provide, as expected, decreased emotion-focused or nonverbal support. Hypothesized associations for attachment anxiety could only be partially confirmed. Highly anxious women provided decreased emotion-focused support, while highly anxious men provided increased negative support.

Discussion

The purpose of the current study was to trigger dyadic coping behavior in couples in order to examine effects of attachment anxiety and avoidance in relying on the partner as a safe haven when stressed (support seeking), and in offering a safe haven for the stressed partner (support providing). Couples were randomly assigned to three experimental conditions: Either the woman (experimental condition 1), the man (experimental condition 2), or both partners were stressed (experimental condition 3) by means of the Trier Social Stress Test (Kirschbaum et al., 1993). Results justify the effort to distinguish different forms of stress communication (i.e., support seeking) and support behaviors (i.e., support providing) in the observed dyadic coping process.

When stressed alone, women were overall communicating more stress than men, in line with previous self-report data (e.g., Bodenmann & Cina, 2006). This difference resulted in higher frequencies of nonverbal, emotion-focused, and negative support behaviors in male partners in comparison to female partners (experimental condition 1 and 2). The more stress women perceived the more nonverbal and emotion-focused SC was observed in the interaction with the partner following the TSST. Stressed men, on the other hand, expressed more problem-focused SC, the more stressed they perceived.

When both partners were stressed by the extradyadic stressor (experimental condition 3), there were no gender differences in frequencies of stress communication (SC) or support behaviors. Although frequencies of emotion-focused SC were comparable when both partners were stressed, stressed partners (experimental condition 3) provided less emotion-focused support in comparison to unstressed partners (experimental condition 1 and 2). In addition, stressed men provided less negative support than unstressed men.

Relying on the partner as a safe haven: Support seeking

Stress communication (SC) of highly anxious women was characterized by a more superficial way of seeking support, when only they were stressed (experimental condition1). The higher the women rated their attachment anxiety, the less emotion-focused and the more problem-focused SC was observed in the interaction with the partner. Highly anxious women also expressed more stress nonverbally. This differential effect of women's anxiety could not have been detected, if one would have only examined the association between attachment anxiety and the total amount of SC, positive and negative effects equalize the association between anxiety and the total amount of SC. However, it is more complicated for the partner to react with adequate support behavior when stress is only expressed in a superficial way (Bodenmann, 2007).

In stressed men, attachment anxiety had no effect on SC behaviors whether only they were stressed (experimental condition 2) or both partner were stressed (experimental condition 3). Therefore, there was no evidence for highly anxious men to hyperactivate the attachment system after being stressed by an extradyadic stressor. In general, men were communicating less stress and reported lower levels in attachment anxiety than women.

Attachment avoidance, on the other hand, was not, as expected, associated with stressed partners' emotion-focused SC. Highly avoidant individuals did not differ in the amount of expressed emotions in comparison to individuals reporting low levels in avoidance. However, for stressed men (experimental condition 2), avoidance was positively associated with problem-focused SC. Problem-focused SC could be an effective strategy to avoid intimacy for highly avoidant men, one can avoid to disclose personal information. However, after the TSST problem-focused coping was not particularly adaptive as the stressful situation was terminated and the characteristics of the stressful situation could not be altered anymore during the interaction with the partner (Lazarus & Folkman, 1984).

When both partners were stressed simultaneously, stressed women's as well as stressed men's avoidance was associated with decreased neutral SC (neutral SC was reduced for this experimental condition in comparison to experimental conditions with only one stressed partner). When both partners experienced the same stressor, intimacy between partners could have been generated by collaborating as a team ("we against the stressor"). Lyons, Mickelson, Sullivan, and Coyne (1998) described this phenomenon as a process of "communal coping". The fact that intimacy is contradictory to an avoider's attachment goal could explain why highly avoidant individuals shared less information with their partner about what happened during the TSST.

In sum, we found only some evidence for highly anxious women to hyperactivate the attachment system by communicating more stress following the TSST. However, they communicated more stress on a superficial level. In contradiction to previous findings (Collins & Feeney, 2000; B. C. Feeney & Collins, 2001; Simpson et al., 1992), attachment avoidance was not associated with reduced or indirect support seeking (with the exception of increased neutral SC in experimental condition 3). It remains unclear if these findings are specific to our experiment because dyadic coping was only triggered after the TSST. The stressful situation was, therefore, terminated when stressed individuals interacted with the partner. Especially after an extradyadic stressor such as the TSST, stressed individuals could be more vulnerable if they express stress. This could explain why highly anxious women preferred to communicate their stress more superficially without mentioning their emotional states – a strategy with which they can avoid appearing vulnerable to avoid being abandoned, but can still activate the attachment system. However, to draw a definite conclusion, these findings should be compared to an observed dyadic coping process triggered before a stressful task (cf. Simpson et al., 1992; Simpson et al., 2002).

Offering a safe haven for the partner: Support providing

Women's attachment anxiety was, in line with our hypothesis, negatively related to emotion-focused support. Regardless whether or not women were stressed simultaneously with their partner, highly anxious women provided less emotion-focused support. However, the support quality of highly anxious women was only poorer with regard to the amount of emotion-focused support, but not with regard to the amount of negative support. Contrary to our expectations, highly anxious women provided less negative support when they were not stressed by the TSST (experimental condition 2). In sum, there was no evidence that highly anxious women became overinvolved in their support behaviors; they provided less emotion-focused support. Therefore, highly anxious women were, in line with previous findings (e.g., Collins & Feeney, 2000; Davila & Kashy, 2009; B. C. Feeney & Collins, 2001), less sensitive in their support behavior.

However, for unstressed male partners (experimental condition 2), higher anxiety levels were associated with decreased problem-focused and, contrary to our expectations, increased emotion-focused support. The quality of support provision was, therefore, better for highly anxious unstressed men, since problem-focused support is not very appropriate in this situation (Lazarus & Folkman, 1984). This effect was not present if men were stressed simultaneously with their female partners (experimental condition 3). In stressed men, attachment anxiety was positively associated with negative support, in line with our hypothesis.

Attachment avoidance, on the other hand, was associated with poorer support quality for men (cf. Simpson et al., 1992; Simpson et al., 2002). Highly avoidant men provided less nonverbal and more negative support when they were not stressed (experimental condition 1). However, when both partners were stressed, avoidance was not related to men's nonverbal or emotion-focused support behavior, which was contrary to our expectations. In this third

experimental condition, highly avoidant men tended to be less attentive and showed less interest in their partner. For female support providers, on the other hand, attachment avoidance was not related to frequencies in different support behaviors when they were not stressed (experimental condition 2). Surprisingly, highly avoidant women were very unlikely to provide negative support when they were stressed simultaneously with the partner (experimental condition 3). Contrary to our hypothesis, nonverbal support was not related to women's avoidance levels. Overall, men's and women's attachment avoidance were unrelated to frequencies of emotion-focused support.

One or both partner stressed: Effect of different experimental conditions

Except for the reduced emotion-focused support in highly anxious women, the role of attachment anxiety and avoidance for the dyadic coping process varied for female and male partners whether one or both partners were stressed during the experiment. This was also obvious in self-reported stress levels. Only when both partners were stressed (experimental condition 3), attachment anxiety and avoidance were positively related to perceived stress levels after the TSST. This was not the case for stressed women and men in experimental condition 1 and 2 (one partner stressed); with the exception that highly anxious men reported more stress. We can, therefore, assume that the situation with only one stressed partner is not comparable to the situation with two stressed partners of a dyad. According to Collins, Guichard, Ford, and Feeney's (2006) interpretation of Bowlby's theory, care giving is only possible if one's own attachment system is not activated.

However, a couples' everyday life includes many situations where both partners are stressed. The current findings highlight the importance of clearly specifying the stressor and its circumstances for stress research with couples (cf. Karney et al., 2005; Randall & Bodenmann, 2009). Support behaviors in the context of extradyadic stress cannot be generalized to support behaviors during an intradyadic stress, in which the partner himself or

herself can be the source of stress. For highly anxious individuals, the function of expressing emotions in conflict discussions may be more aimed at maintaining proximity to the attachment figure than in seeking support following an extradyadic stress (Fraley & Shaver, 2000).

Caveats of the current study

The context of an extradyadic stress could also explain why we found hardly any effects of attachment avoidance on the dyadic coping process. According to Fraley and Shaver (2000), avoidance and not anxiety may represent the behavioral aspect of the attachment system. Contrary to our expectations, attachment avoidance was for all partners not related to the amount of emotion-focused SC or support. Only for unstressed male partners, were high levels in avoidance associated with poorer care giving quality characterized by increased negative and decreased nonverbal support. However, individuals in our study were not instructed how to interact. The interaction was completely unstructured without any instruction to explicitly provide support. It is, therefore, possible that effects of avoidance may be stronger in conflict discussions or other structured interactions with forced emotional disclosure. Such discussions may be more threatening for highly avoidant individuals as they may trigger more intimacy, which contradicts their attachment goal (for an overview for conflict discussions, see Pietromonaco, Greenwood, & Barrett, 2004).

When interpreting our results, one also has to consider that attachment anxiety and avoidance were measured on continuous dimensions. They do not represent clinically relevant measures of attachment anxiety or avoidance. However, we assume that significant effects may be even stronger for clinically relevant levels of anxiety and avoidance. Moreover, the experimental setting allowed unstressed partners (who did not participate in the TSST) full potential to support their stressed partner. Unlike in everyday life, they were aware of the mock job interview and could infer why their partners might interact differently. As Collins

and Feeney (2004) pointed out, attachment is especially relevant in ambivalent situations, which may cultivate negative interpretations of partner behavior. Thus, the effects of support providers' attachment anxiety and avoidance on their support behavior may be underestimated.

Given the special distribution of data, frequencies of different behaviors were zero-inflated and over-dispersed, statistical data analysis was restricted. Therefore, we only included attachment anxiety and avoidance of the support seeker, respectively of the support provider themselves (actor-effects of attachment) to predict specific behavior within the dyadic coping process. Stress communication and support behavior could also depend on partner's attachment anxiety and avoidance (partner-effects of attachment). However, this concern was difficult to manage with given sample size and data distribution of different behaviors. Moreover, it was not possible to estimate a whole mediation model, in which one's stress communication behavior would mediate the relation between experienced stress in the TSST and partner's support behavior. We resolved this problem by controlling for self-reported stress for the estimation of stress communication behaviors, and for the total amount of partner's stress communication for the estimation of support behaviors. Unfortunately, it was not possible to calculate effect sizes such as R^2 or Pseudo-R^2 for estimated negative binomial regression models (not applicable for this model; see Coxe et al., 2009).

Beside these limitations, we believe that the strengths of our study are its experimental design with a highly standardized stressor and its multi-methodological approach. If we did not evaluate different forms of stress communication and support behaviors, one could not have detected that highly anxious women express stress on a more superficial level and provided less emotion-focused support. For unstressed men, on the other hand, attachment anxiety seems to be associated with better support quality.

However, these differential effects for women and men regarding their attachment need to be replicated. A distal goal of prospective research should comprehend the development of practical guidelines for couple interventions. Such guidelines should include indications which intervention is most appropriate for a specific couple including two individuals with particular attachment goals. Our findings offer evidence that, in the context of an extradyadic stress, attachment avoidance and anxiety have differential effects on dyadic interaction.

5. Excursus: Dyadic interaction and depression—intradyadic stress

5.1 Expressed emotion and depression: Testing a mediation effect of dysfunctional attitudes (STUDY 3)

The association between partner's expressed emotions and depression: Mediated by patient's dysfunctional attitudes?[12]

Abstract

The role of expressed emotion in depression is well documented as is the importance of dysfunctional cognitive processes. A potential mediational role of dysfunctional attitudes for the association between partner's expressed emotion (EE) and depression was examined in a sample of $N = 63$ couples with one clinically depressed partner (37 of them were females). It was hypothesized that cognitive functioning (i.e., personal dysfunctional attitudes) was affected by interpersonal variables such as partner's EE, resulting in increased depressive symptoms. Statistical analyses were conducted with dyadic data showing that dysfunctional attitudes of depressed patients as well as EE of the partner were significantly associated with higher depression scores. The hypothesized indirect effect was present in depressed patients, indicating that partner's EE played a more important role for patients' dysfunctional attitudes and their depression, while non-depressed partners dysfunctional attitudes and depression scores were not affected by patient's EE. The significance of findings for the treatment of depression is discussed.

Keywords: depression, expressed emotion, dysfunctional attitudes, close relationship

[12] Paper by N. Meuwly, G. Bodenmann, & J. C. Coyne

Introduction

A long tradition of depression research focuses on the role of negative cognitive styles in the disorder such as dysfunctional attitudes and inadequate attribution processes (e.g., Abramson, Seligman, & Teasdale, 1978; Beck, 1967) or hopelessness (e.g., Abramson, Metalsky, & Alloy, 1989). In particular, dysfunctional or depressogenic schema are a key element in Beck's theory for understanding depression. These schemas are closely linked to dysfunctional information processing and usually get triggered by critical life events. In times of increased stress, individuals' appraisals of situations, expectations as well as memory processes, are affected by these schema and cognitive processes are negatively biased. In this state, the depressed individual focuses more easily on negative themes which increases negative mood. Negative thinking (i.e., negative automatic cognitions) results from the activation of these dysfunctional schemas and a negative view of oneself, the environment, and the future—the cognitive triad—characterizes the depressed individual's cognitive functioning. Numerous studies support Beck's assumption that dysfunctional attitudes are linked to depression (for a review, see Haaga, Dyck, & Ernst, 1991), while a reduction in dysfunctional attitudes resulted in reduction of depressive symptoms after Cognitive Behavioral Therapy (e.g., Quilty, McBride, & Bagby, 2008). As several recent studies were not able to detect the theoretically predicted elevated dysfunctional attitudes in remitted patients (e.g., Haeffel et al., 2005), dysfunctional attitudes may represent a fluid state rather than a stable trait and are, therefore, an important individual characteristic of symptomatology of depression and its maintenance.

A large body of literature provides evidence for the importance of interpersonal variables such as expressed emotion (EE) for the development, course, and outcome, including likelihood of relapse of psychological disorders such as depression (Hooley, 1986; Hooley, 2007; Hooley & Hahlweg, 1986), anxiety or compulsive disorders (e.g., Chambless, Bryan,

Aiken, Steketee, & Hooley, 2001), schizophrenia (Vaughn & Leff, 1976) as well as adaptation to physical illness (as an example for chronic heart failure, see Benazon, Foster, & Coyne, 2006). Expressed emotion, originally assessed by a semi-structured interview of family members (or the partner) concerning the patient (Camberwell Family Interview [CFI]; Leff & Vaughn, 1985), represents attitudes towards the patient characterized by criticism, hostility, and emotional overinvolvement. Expressed emotion is construed to reflect disturbances in the organization, emotional climate, and transactional patterns of the entire family system (Hooley, 2007). Typically not all three components (criticism, hostility, emotional overinvolvement) have been found to be similarly important for the prediction of disorders' outcome. Criticism yielded most consistent evidence for its harmful influence of poor psychological well-being and a significantly higher risk for relapse (for a review, see Butzlaff & Hooley, 1998; and Hooley, 2007). This finding is robust even with regard to different instruments assessing expressed emotion such as the Camberwell Family Interview (CFI) or the Five Minute Speech Sample (FMSS; Magaña et al., 1986), where the partner is invited to talk about his or her partner during five minutes, addressing negative and positive aspects.

Interactions of high critical spouses are characterized by more negativity towards the depressive partner (e.g., Hooley, 1986; for high EE relatives of schizophrenics defined by the FMSS, see also Hahlweg et al., 1989). However, the association between depressed patients' cognitive functioning (e.g., dysfunctional attitudes or negative thinking) and interpersonal variables such as expressed emotion has, thus far, rarely been examined (Coyne, 1976a, 1976b; Coyne & Benazon, 2001; a large body of research concentrated on the relation between reassurance seeking and depression, for a meta-analytic review see Starr & Davila, 2008). However, some studies looking at attributions of relatives revealed that high-critical compared to low-critical relatives of depressed patients were blaming patients more often for

their problems (i.e., internal attribution) (for a review, see Barrowclough & Hooley, 2003). Thus, increased negative self-perceptions have been found to explain the positive association between negative maternal feedback and depressive symptoms in adolescence (Jacquez, Cole, & Searle, 2004). In another study by Henriques and Leitenberg (2002), negative social feedback was related to students' increased depressive mood. Negative thinking and dysfunctional attitudes were positively associated with depressive mood following the negative feedback, controlled for previous depressive mood in the experimental setting. These studies provide examples of investigations of cognition as a potential mediator between interpersonal experiences and depressive symptoms. To our knowledge, no study has thus far linked cognitive dysfunctions, romantic partners' expressed emotion, and depression, three leading concepts in depression research (see also Gibb, Uhrlass, Grassia, Benas, & McGeary, 2009, for mother-child dyads).

In the present study, the association between expressed emotion, specifically partners' criticism, and depression are examined. This association is hypothesized to be mediated by dysfunctional attitudes. Thus, depressed patients with highly negative partners should report more negative attitudes and score higher in depression. This link might be particularly important theoretically and clinically, as negative self-attitudes might be shaped by partner's blaming and criticizing of the depressed patient. Thus, criticism of the partner may be internalized and nurture dysfunctional attitudes.

Consistent with a Diathesis-Stress Model for depression (e.g., Clark & Beck, 2010), we tested an alternative model, in which EE moderates the association between dysfunctional attitudes and depression. However, as we interpret partner's EE as an everyday stressor within a close relationship, that may shape patient's negative thinking, and not as a critical life event, we expect that this moderation effect would not be significant in depressed patients.

Methods

Research Participants

The sample consisted of 63 couples with one partner suffering from depression (37 of the couples with a depressed woman). All depressed patients were screened by the German version of the Structured Clinical Interview (SCID-I; Wittchen, Wunderlich, Gruschwitz, & Zaudig, 1997), and were required to meet Research Diagnostic Criteria (RDC; Spitzer, Endicott, & Robins, 1979) for Major Depressive Disorder or Dysthymia. According to German cut-off scores for depression (Hautzinger, Bailer, Worall, & Keller, 1994), they additionally had to score 12 or above on the BDI (Beck Depression Inventory; Beck, Steer, & Carbin, 1988). Exclusion criteria for patients were psychotic and manic symptoms; bipolar depression; personality disorders; drug abuse; and acute suicidality. Apart from four patients who had other depressive disorders, all patients met full criteria for Major Depression. All participating couples had to be in an intimate and stable relationship for at least one year.

Couples were recruited by means of advertisements in newspapers, information flyers, personal information given by psychotherapists and public talks in clinics. The sample was originally recruited for a randomized depression intervention study (Bodenmann et al., 2008). The present data were collected prior to depression treatment. Of the former 496 subjects interested in the study, 68 subjects with their partners met inclusion criteria. Thirty-nine percent of the interested individuals were excluded because they were single; 27% because of symptomatology; 18% had a partner not willing to participate in the study; 13% were older than 60 years; and 3% were insufficient in German. As four couples did not complete the Five Minute Speech Sample, they refused videotaping, and data of one couple was incomplete, the final sample size for the current analysis was $N = 63$ couples.

Participants were on average 45.59 years old (*SD* = 10.84); patients and partners were overall comparable in their age $t(62) = 1.93$, $p = .847$. Most of the couples (82.5%) lived in cohabitation with their partner, and 74.6% were married. Most couples (70%) had children. Mean relationship duration was 16.8 years (*SD* = 11.3). Mean relationship quality (*M* = 52.66) was below the cut-off score for a satisfied relationship (a score of 54-72 indicating a satisfying close relationship; according to Hahlweg, 1996). However, there was considerable variation (*SD* = 16.49) in relationship satisfaction measures, with no significant difference for patients and partners $t(62) = -1.12$, $p = .268$). Nearly half of the patients (47.6%) reported to be in their first depressive episode.

Measures

Beck Depression Inventory (BDI; Beck et al., 1988). In this study we used the German version of the 21-item self-report measure of depressive symptoms (Hautzinger et al., 1994). Both partners were asked to complete the questionnaire independently from each other. The BDI is a widely-used measure with clinical, community, and student samples, and well-established reliability and validity. Internal consistency in our study was $\alpha = .80$ for depressed patients and $\alpha = .82$ for partners.

Hamilton Rating Scale for Depression (HRSD; J. B. W. Williams, 1988). The HRSD (originally proposed by Hamilton, 1960) is a 17-item semi-structured clinical interview allowing clinicians to assess severity of depression in a sample of diagnosed depressed patients, over recent and extended time intervals. It is one of the most frequently used rating scales to assess depression in research because of its high level of reliability and validity (Bagby, Ryder, Schuller, & Marshall, 2004). It provides a complementary observer perspective to self-report measures such as the BDI. In this study, the HRSD was conducted with depressed patients by a trained clinical psychologist at the patient's home. As the HRSD

was originally designed for use only with depressed patients, these interviews were not conducted with non-depressed partners. Mean inter-rater reliability was κ = .80 (80% of interviews were rerated by a second interviewer to obtain interrater-reliability).

Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978). Patients and partners both rated the 40 items of the German version of the DAS (Hautzinger, Luka, & Trautmann, 1985). The DAS is based on Beck's concept of dysfunctional attitudes and the negative triad (i.e., negative view of oneself, the environment, and the future). Internal consistency of the scale was α =.75 for depressed patients and α =.86 for partners.

Expressed emotion. The Five Minute Speech Sample (FMSS; Magaña et al., 1986) was conducted to measure expressed emotion. During five uninterrupted minutes, one partner was invited to talk about his or her feelings and thoughts with regard to the other partner. Speeches were videotaped and subsequently coded for the number of positive and negative remarks (criticism, hostility, and over-involvement) concerning the partner. The five minute speech sample was conducted separately with both the depressed patient as well as the non-depressed partner. Statistical analyses reported in this paper are based on the total number of critical statements made by participants. Behavioral coders were thoroughly trained during three months prior to coding work and had to complete an exam testing their interrater-reliability. A one-week introduction to the coding system was provided in the lab of Dr. Peter Fiedler (University of Heidelberg), who studies expressed emotion in depressed patients and uses the FMSS (Kronmüller et al., 2008). Interrater-reliability between the two coders for EE categories was κ = .82. Although the FMSS may slightly underestimate the prevalence of high EE relative to the CFI, several studies have shown satisfying psychometric properties of this instrument, mainly for the prediction of relapse of depression (e.g., Asarnow, Goldstein, Tompson, & Guthrie, 1993). An advantage of this instrument is its practicality and ready clinical applicability, as it is considerably less time-consuming than the CFI (Hooley &

Parker, 2006). The FMSS provides a valuable alternative to the CFI, at least in the context of depression.

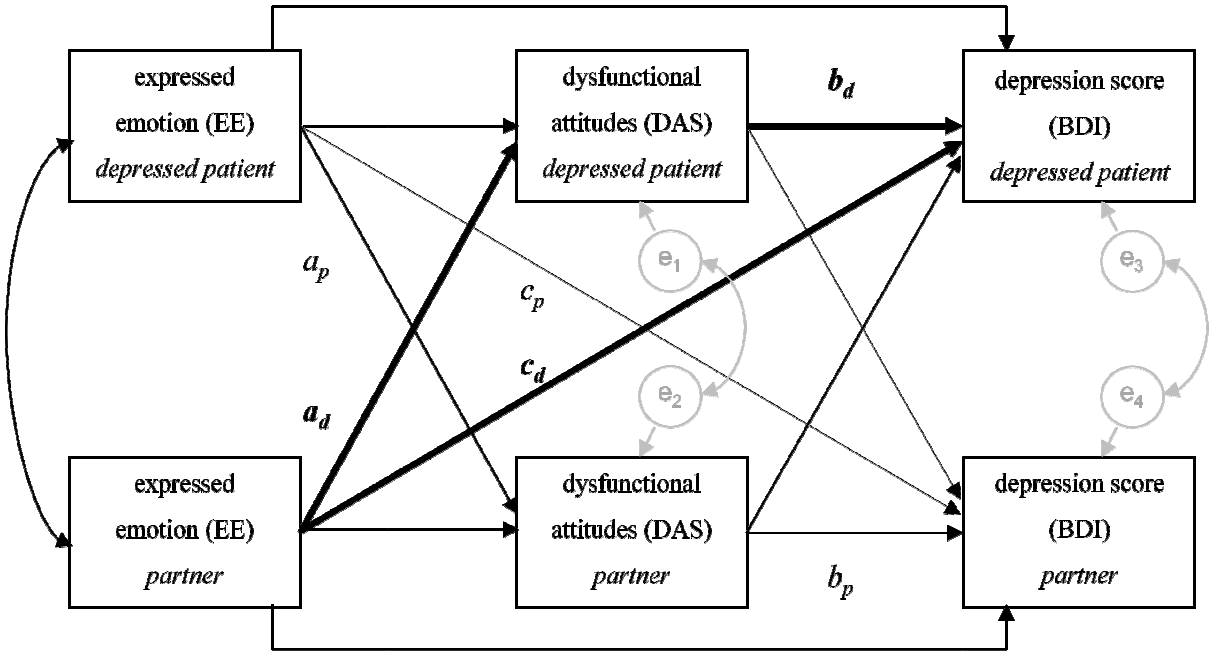

Figure 7: Saturated Actor-Partner-Interdependence-Model with mediation (APIM)

Note. A simplified mediation model with paths in bold was tested for HRSD depression measure for depressed patients.

Statistical Analyses

Statistical data analyses were based on the Actor-Partner-Interdependence-Model (APIM; Kenny & Cook, 1999) with mediation (Ledermann & Bodenmann, 2006) presented in Figure 7. The APIM allows estimating actor and partner effects simultaneously within a couple. An actor effect represents an association between two variables of the same individual (e.g., the effect of the patient's DAS score on the patient's depressive symptoms); while a partner effect represents an association between two variables of different partners (e.g., the effects of the partner's EE score on the patient's DAS score). According to our hypothesis, we expected that partner's EE is positively associated with patient's DAS score (path a_d); and patient's

DAS score is positively associated with patient's depression (path b_d). It was of special interested if the direct association between partner's EE and patient's BDI score (path c_d) would remain significant after controlling for indirect effects (the indirect and direct effects in the center of interest are all printed in bold in Figure 7; the according path for non-depressed partners are described as path a_p, b_p, and c_p). To test for significance of the mediation effect, the product of paths a_d x b_d (representing the indirect effect between partners' EE and depression) is tested for significance (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

As HRSD measures were only present for patients, we estimated in a second step a simple mediation model estimating patient's HRSD scores including all relevant path of the previous APIM (path a_d, b_d, and c_d). We further analyzed two alternative moderation models including the interaction of patient's DAS scores and partner's EE to estimate patient's depression scores. According to Cohen, Cohen, Aiken, and West (2003), we first centered the variables before we composed interaction terms.

Due to the non-normal distribution of EE scores and the small sample size, we conducted bootstrap analyses with 1000 bootstrap samples in order to obtain correct standard errors of parameter estimates (Efron & Tibshirani, 1993). These can be used to calculate 95% confidence intervals around parameter estimates and, thus, to identify statistically significant effects. According to recommendations of MacKinnon, Lockwood, and Williams (2004), we included bias-corrected confidence intervals to test for significant direct and indirect effects. Models were estimated with *M-Plus 5* (Muthén & Muthén, 1998-2007).

Results

Depressed patients overall suffered from moderate depression (M = 23.46, SD = 8.42). Partners all scored in the normal range (0-11 according to German norms; Hautzinger et al., 1994) indicating a lack of depressive symptomatology (M = 5.73, SD = 5.11). Patients overall reported higher BDI ($t(62) = 14.70$, $p < .001$) and DAS scores ($t(62) = 7.75$, $p < .001$) than non-depressed partners. The mean frequency of criticism during the FMSS (EE scores) was comparable for patients (M = 2.05, SD = 1.81) and non-depressed partners (M = 1.97, SD = 2.09; $t(62) = .24$, $p = .812$).

Table 8: Means, SD, and correlations among variables

		M	*SD*	*correlations*					
				1	2	3	4	5	6
1	EE patient	2.05	1.81						
2	EE partner	1.97	2.09	.09					
3	DAS patient	3.47	.89	.07	.32 **				
4	DAS partner	2.42	.72	.05	.05	.12			
5	BDI patient	23.46	8.42	.06	.31 *	.43 ***	.07		
6	BDI partner	5.73	5.11	.06	.03	.00	.46 ***	.06	
7	HRSD patient	14.58	6.10	.13	.24 a	.33 **	.01	.47 ***	.23 a

Note. EE = Expressed Emotion; DAS = Dysfunctional Attitude Scale; BDI = Beck Depression Inventory; HRSD = Hamilton Rating Scale. *** $p < .001$; ** $p < .01$; * $p < .05$; a $p < .10$ (two-tailed).

Correlations in Table 8 show a pattern consistent with our hypothesis. Non-depressed partner's EE scores were positively related to patient's DAS (r = .32; $p = .010$), BDI (r = .31; $p = .013$), and HRSD scores (r = .24; $p = .063$). Additionally, patients DAS scores were positively related to their self-reported (BDI: r = .43, $p = .001$) and expert-rated depression scores (HRSD: r = .33, $p = .009$). For non-depressed partners, patient's EE scores were not related to their self-reported DAS and BDI scores, but DAS and BDI scores correlated positively (r = .46; $p < .001$).

Table 9: Estimated parameters of the saturated APIM for self-reported depression (BDI)

		R^2	B	SE	CI 95% bias-corrected	β
DV: DAS patient		.11				
EE patient (a)			.02	.07	(-.097, .168)	.04
EE partner (p)	a_d		**.14**	**.07**	**(.038, .298)**	**.32**
DV: DAS partner		.00				
EE partner (a)			.02	.04	(-.075, .082)	.05
EE patient (p)	a_p		.02	.05	(-.087, .100)	.04
DV: BDI patient		.21				
DAS patient (a)	b_d		**3.40**	**1.26**	**(.856, 5.926)**	**.36**
DAS partner (p)			.19	1.27	(-2.334, 2.370)	.02
EE patient (a)			.07	.53	(-.917, 1.093)	.02
EE partner (p)	c_d		.78	.45	(-.206, 1.693)	.19
DV: BDI partner		.22				
DAS partner (a)	b_p		**3.30**	**1.07**	**(1.534, 5.660)**	**.47**
DAS patient (p)			-.34	.63	(-1.661, .861)	-.06
EE partner (a)			.04	.30	(-.439, .784)	.02
EE patient (p)	c_p		.13	.34	(-.434, .908)	.04
Correlations						
EE			.34	.53	(-.754, 1.304)	.09
DAS residuals			.06	.09	(-.090, .243)	.10
BDI residuals			2.02	3.54	(-4.728, .870)	.06

Note. EE = Expressed Emotion; DAS = Dysfunctional Attitude Scale; BDI = Beck Depression Inventory; HRSD = Hamilton Rating Scale; DV = dependent variable; (a) = actor effect; (p) = partner effect; CI 95% = 95% confidence interval (lower-bound, upper-bound). Significant effects are printed in bold.

We first estimated a saturated APIM with mediation. We were particularly interested in path a_d, b_d, and c_d (printed in bold in Figure 7). Depressive patient's DAS scores were positively related to partner's EE scores (path a_d: B = .14; SE = .07; 95% CI [.038, .298]). The corresponding association for non-depressed partners between DAS and patient's EE scores (path a_p) was not significant (0 included in the 95% CI). DAS scores of both partners were not related to their own EE scores (actor effects not significant). The higher patients scored on the DAS, the higher they scored on the BDI (path b_d: B = 3.40; SE = 1.26; [.856, 5.926]). This positive association was also significant in non-depressed partners (path b_p: B = 3.30; SE =

1.07; [1.534, 5.660]). Contrary to the positive correlation between partner's EE and patient's BDI score, the direct effect of partner's EE on patient's BDI score (path c_d) was not significant after controlling for all other indirect effects (r = .31 vs. β = .19, *ns*). As expected, the indirect effect of partner's EE on patient's BDI score mediated by patient's DAS score (path a_d x b_d) was significant (B = .46; SE = .32; [.104, 1.392]). For non-depressed partners, on the other hand, BDI scores were not associated with patient's EE; the direct effect (path c_p) and the indirect effect (B = .05; SE = .18; [-.249, .436]) were both not significant.

Results of the saturated APIM indicate that there was only one significant partner effect (path a_d), but no significant association between depressed patients and non-depressed partners' EE, DAS, or BDI scores. The findings of the APIM can, therefore, be compared to the simple mediation model estimating patient's HRSD scores by partner's EE scores and patient's DAS scores (this model corresponds to bold dashes in Figure 7 with path a_d, b_d, and c_d).

Table 10: Estimated parameters of the simple mediation model for expert-rated depression (HRSD)

		R^2	B	SE	CI 95% bias-corrected	β
DV: DAS patient		.10				
EE partner	*a*		**.14**	**.06**	**(.043, .260)**	**.32**
DV: HRSD patient		.13				
DAS patient	*b*		**1.92**	**.92**	**(.122, 3.845)**	**.28**
EE partner	*c*		.43	.53	(-.472, 1.496)	.15

Note. EE = Expressed Emotion; DAS = Dysfunctional Attitude Scale; BDI = Beck Depression Inventory; HRSD = Hamilton Rating Scale; DV = dependent variable; CI 95% = 95% confidence interval (lower-bound, upper-bound). Significant effects are printed in bold.

The estimated association between partner's EE and patient's DAS scores in the simple mediation model (see Table 10) was comparable to the estimated path in the previous APIM

(path *a*: B = .14; SE = .06; [.043, .260]). In line with self-reported depression, patient's DAS scores were positively associated with HRSD scores (path *b*: B = 1.92; SE = .92; [.122, 3.845]). The indirect effect (*a* x *b*) predicting HRSD scores by partner's EE (B = .29; SE = .17; [.024, .740]), but not the direct effect (path *c*), was significant. In contrast to the model with self-reported depression (BDI), explained variance of HRSD measures may not be a result of common shared method variance. This model, therefore, provides a stronger test for the significance of the indirect effect, although explained variance for estimated depression measures decreased from 21 to 13%.

In sum, dysfunctional attitudes significantly mediated the relationship between partner's EE and patient's depression (BDI and HRSD). Explained variance was increased for the estimation of self-reported depression (BDI) in comparison to expert-rated depression (HRSD).

We further tested an alternative model of moderation (see Table 11). Interaction effects were not significant, neither for the estimation of patient's BDI (B = .15; SE = 2.35; [-4.606, 4.902]) nor for the HRSD score (B = 1.51; SE = 2.15; [-2.123, 6.053]). There was no substantial increase in explained variance of depression scores after including the interaction term of predictors (no change for BDI; 1% increase for HRSD). To conclude, there was no statistical evidence that high EE by the partner would moderate the association between dysfunctional attitudes (DAS) and depression (BDI or HRSD) in depressed patients.

Table 11: Alternative moderation models

	R^2	B	SE	CI 95% bias-corrected	β
		BDI (self-reported depression)			
DV: depression patient	.21				
DAS patient		**3.37**	**1.44**	**(.266, 6.140)**	**.36**
EE partner		.775	.45	(-.246, 1.551)	.19
interaction DAS x EE		.15	2.35	(-4.606, 4.902)	.01
		HRSD (expert-rated depression)			
DV: depression patient	.14				
DAS patient		1.42	1.49	(-1.673, 4.120)	.21
EE partner		.35	.48	(-.458, 1.324)	.12
interaction DAS x EE		1.51	2.15	(-2.123, 6.053)	.13

Note. EE = Expressed Emotion; DAS = Dysfunctional Attitude Scale; BDI = Beck Depression Inventory; HRSD = Hamilton Rating Scale; DV = dependent variable; CI 95% = 95% confidence interval (lower-bound, upper-bound). Significant effects are printed in bold.

Discussion

Associations between both dysfunctional attitudes and depression (for a review, see Haaga et al., 1991), and partner's expressed emotion and between depression (for a review, see Hooley, 2007), are well established. However, the association between the interpersonal construct of expressed emotion (EE) and the intrapersonal concept of dysfunctional attitudes has not been examined in the context of close relationships so far. To our knowledge, this is the first study investigating direct and indirect associations between partner's EE and patient's depression. Analyses were conducted with 63 couples with a clinically depressed partner.

Depression was significantly associated with dysfunctional attitudes in depressed patients. In line with previous findings (Haaga et al., 1991), the higher patients scored on the BDI, the more dysfunctional attitudes (DAS) they reported. A similar positive association was found for non-depressed partners. However, only in depressed patients, was partners' EE

significantly associated with patient's DAS scores, on the one side, and depression scores, on the other side.

However, the direct effect of partners' EE of patient's depression was not significant after controlling for the indirect effect mediated by patient's DAS score, neither for the estimation of patient's self-reported depression score (assessed by the BDI) nor for the estimation of expert-rated depression score (assessed by the HRSD). The estimation of a saturated APIM with mediation revealed that no other cross-over effect between dysfunctional attitudes and depression was significant beside the association between partner's EE and patient's DAS scores.

The estimation of alternative models of moderation did not reveal a significant interaction effect. There was no statistical evidence that partner's EE would trigger dysfunctional attitudes. As expected, a mediation model fits better to our sample with depressed patients and their partners. Another argument against the moderation model is the comparable association between DAS and BDI scores for non-depressed partners and patients. This implies that only in depressed patients, EE by the partner is linked with—and nurtures—dysfunctional attitudes what could explain the increase in DAS and BDI scores without altering the magnitude of the association between these two variables. This finding for depressed patients underlines the importance of interpersonal behavior to understand the maintenance of depression. A moderation model may be more effective for the prediction of the onset of a depressive disorder.

We explored the same models for patient's gender effects. The positive association between partners' EE and patient's dysfunctional attitudes, and the according indirect effect between partners' EE and patient's depression were only significant in couples with a depressed man. However, as statistical power was low, it is possible that this effect might be found in a larger sample of depressed women. A possible explanation for the gender

difference might be that women express more often their negative feelings and attitudes towards their partner, and thus have a stronger impact on male partner's dysfunctional attitudes. Men, on the other hand, tend to withdraw more often and are more likely to be less expressive (e.g., Heavey, Layne, & Christensen, 1993). Another noteworthy difference in couples with a depressed man and couples with a depressed woman was that patient's EE and partner's EE were only significantly correlated in couples with a female patient, suggesting a reciprocal process of partner's negativity in couples with a depressed woman. Gender differences in couples' negative communication behavior are well documented (e.g., Bodenmann, Kaiser, Hahlweg, & Fehm-Wolfsdorf, 1998; Gottman, 1994; Heavey et al., 1993), but not yet for the context of depression and expressed emotion. As gender differences in the prevalence of depression are consistently reported, indicating that depression seems to be more linked to relationship quality in women than in men (Beach, Katz, Kim, & Brody, 2003; Whisman, 2001), these findings suggest studying couples with a depressed woman and couples with a depressed man separately.

One limitation of the current study is the cross-sectional design which is not allowing any interpretation of causal pathways. The mediational hypothesis needs a stronger test in future with longitudinal data in order to test direction of effects. With cross-sectional data, one cannot exclude that the model with opposite effects—DAS increasing partners' EE—is more adequate; such a model is statistically equivalent to the tested model. Nonetheless, the tested indirect effect is remarkable as the associations are not a result of shared method variance. For the simple mediation model estimating HRSD depression measures, all variables were measured with different methods (self-report for the DAS, observed behavior for EE, and a semi-structured clinical interview for HRSD).

A novel mediational hypothesis in this study has been tested, linking intrapersonal mechanisms (dysfunctional attitudes, depression) with an interpersonal phenomenon

(expressed emotion). Thus far, the literature on the role of expressed emotion for psychiatric disorders has predominately focused on relapse prediction (Hooley, 2007). This study aimed to contribute to a better understanding of the concrete role of partner's attitudes and behavior for depressive symptoms in the depressed patient as the partner seems to play an important role in depression (e.g., Beach, Jones, & Franklin, 2008; Coyne, Thompson, & Palmer, 2002; Joiner, Brown, & Kistner, 2006). Given that dysfunctional attitudes often are a main target of therapy (according to Beck's depression therapy; Beck, Rush, Shaw, & Emery, 1979) and yield remarkable treatment outcomes (e.g., Elkin et al., 1989; Hautzinger et al., 1996; Wampold, Minami, Baskin, & Callen Tierney, 2002), there is theoretical and clinical interest to understand by whom these dysfunctional attitudes are influenced. As in cognitive therapy, despite all merits of this approach, recovered patients still have a considerable risk for relapse (Belsher & Costello, 1988), predictors of relapse require special attention. During the last decades, expressed emotion was consistently found to be a relevant and significant predictor of relapse in depression. Hooley and colleagues (Hooley, Orley, & Teasdale, 1986) reported that the risk for relapse was six times higher in remitted patients up to nine months after remission. Thus the answer to how expressed emotion (dysfunctional attitudes of the partner towards the depressed patient) and dysfunctional attitudes (of the depressed patient himself or herself) are linked to each other and to depression, may be important for the treatment of depression. In a study by Bodenmann et al. (2008), couple therapy was as efficacious as individual treatments, such as cognitive behavioral therapy and interpersonal psychotherapy, in reducing depressive symptoms (BDI). Moreover, couple therapy was among these three treatments the only approach reducing partner's expressed emotion what might be the reason for lowered risk of relapse after couple therapy in that study (Bodenmann et al., 2008). Also Leff et al. (2000) have shown that interpersonal aspects are relevant for depressive patients living with their partner. In their study, couple therapy was better accepted and was as effective as medication therapy.

Our findings suggest that partner's attitudes could be highly important for the severity of depressive symptoms, in addition to their established relationship with relapse (Butzlaff & Hooley, 1998; Hooley, 2007). However, findings are only preliminary and there is need for longitudinal research to clarify temporal order of examined associations.

GENERAL DISCUSSION

6. Goal of the study

The purpose of the current experimental study was to trigger dyadic coping behavior in couples and to examine effects of attachment anxiety and avoidance in the process of dyadic coping and physiological stress recovery. 198 heterosexual couples were randomly assigned to three experimental conditions: either the woman (experimental condition 1), the man (experimental condition 2), or both of the partners were stressed (experimental condition 3) by means of the Trier Social Stress Test (TSST; Kirschbaum et al., 1993), a highly standardized extradyadic stressor. Couples interactions following the TSST were videotaped, and partners' stress communication (i.e., support seeking) and support behaviors (i.e., support providing) were subsequently coded.

7. Summary of findings

7.1 One partner stressed (experimental condition 1 and 2)

When only one partner was stressed, women and men did not differ in perceived stressed levels after the TSST, but stressed women expressed more stress overall than stressed men during the interaction with the partner. As a result, male partners were observed to provide more support compared to female partners. In general, stressed individuals recovered faster from stress in their salivary cortisol levels, the more positive support they received from the partner.

However, highly anxious women benefitted less from partners' positive support: The effect of partner's support on stress recovery was decreased (moderation effect). Moreover, they had a weaker cortisol stress reaction during the experiment (Study 1). During the

interaction with the partner, highly anxious women communicated stress more superficially (more problem-focused, more nonverbal and less emotion-focused stress communication) than women who reported low anxiety levels (Study 2)[13]. Highly anxious men, on the other hand, did not differ from men with low anxiety levels in their observed stress communication behavior (Study 2) or in their benefit from partner support regarding cortisol stress recovery (no moderation effect in Study 1). But they reported higher stress levels after the TSST and received more positive support from their female partners, the higher their self-reported attachment anxiety (positive correlations).

Effects of attachment anxiety were also tested for effects on support behaviors after the TSST. For female partners, high levels in attachment anxiety were related to decreased emotion-focused and negative support behaviors. For male partners, on the other hand, high levels in attachment anxiety were related to better support quality providing increased emotion-focused and decreased problem-focused support.

Attachment avoidance had, contrary to our expectations, only few effects. Highly avoidant women and men benefitted from partner support to a comparable degree as low avoidant individuals; they recovered faster from stress the more positive support they received (no moderation effect in Study 1). Furthermore, attachment avoidance was not related to perceived stress levels after the TSST and stress communication behavior, when only one partner was stressed (with the exception that highly avoidant men expressed more problem-focused stress).

Female partners support providing behaviors were not associated with attachment avoidance. But highly avoidant men, on the other hand, were more likely to be negative in their support behavior and providing less nonverbal support (Study 2).

[13] Additional analysis revealed no partner effect of stressed women's attachment anxiety on male partners support behavior, neither for the total amount of positive support nor distinct forms of support behaviors.

7.2 Both partners stressed (experimental condition 3)

When both partners were stressed, the dynamics of the dyadic coping processes were different to other experimental conditions[14]. Overall, less stress communication and less support was observed in the interaction after the TSST, without any difference between genders. Contradictory to other experimental conditions (1 and 2), women and men perceived more stress, the higher their attachment anxiety and avoidance levels were.

Women's attachment anxiety was not related to stress communication behavior. In line with the condition where they were not stressed (condition 2), highly anxious women were less likely to provide emotion-focused support. Highly anxious men, on the other hand, expressed less stress nonverbally and were more negative in their support behavior in comparison to men reporting low levels in attachment anxiety.

Attachment avoidance was associated with decreased neutral stress communication for both partners, while highly avoidant women were very unlikely to provide negative support, and highly avoidant men were less attentive and showed less interest in the partner, when they were stressed.

[14]As the dyadic coping process within this experimental condition 3 was not comparable to other experimental conditions with only one stressed partner, this group was not included in Study 1. However, stressed men recovered faster from stress, the more support they received from their female partner. Contrary to experimental condition 1, partner support had no significant effect on women's cortisol stress recovery.

8. Limitations of the study

In interpreting the findings of our study, one has to consider several limitations. Our sample consisted of mainly satisfied couples showing hardly any negative behavior in dyadic interaction. Due to this restriction in variance of negative support behaviors, one cannot interpret this as an indicator that negative support would not affect cortisol stress recovery. Many studies have shown a detrimental effect of negative interaction on partner's well-being (for an overview, see Proulx et al., 2007; and Robles & Kiecolt-Glaser, 2003). It is, therefore, possible when considering more distressed couples that negative support would impair cortisol stress recovery.

The Trier Social Stress Test (Kirschbaum et al., 1993) represents a standardized short-term laboratory stress induction (Dickerson & Kemeny, 2004). However, it remains unclear how relevant the findings are for an everyday stress and stress recovery. Nonetheless, the advantage of our experimental study is its high internal validity. The highly standardized stressor minimizes a possible confounding of the intensity of the stressor and the amount of support a partner receives, which is typically problematic in questionnaire studies. Support-providing in our study was reduced to eight minutes while being seated on a sofa.

The context of an extradyadic stress could explain why we found hardly any effect for attachment avoidance on the dyadic coping process and stress recovery. Contrary to our expectations, attachment avoidance was not related to the amount of emotion-focused stress communication and did not moderate the effect of partner support on stress recovery. Only for unstressed male partners (experimental condition 1) were high levels in avoidance associated with increased negative and decreased nonverbal support, but not, as expected, decreased emotion-focused support. Contradictory to highly anxious individuals, highly avoidant individuals are characterized by a positive self-view. It is, therefore, possible that highly

avoidant individuals have a higher threshold of stress, so that differences in behavior in contrast to more securely attached individuals would become observable. Moreover, individuals in our study were not instructed how to interact; the interaction was completely unstructured without any instruction to explicitly provide support. The effects of avoidance may be stronger in conflict discussions or other structured interactions with forced emotional disclosure. Such discussions may be more threatening for highly avoidant individuals as they may trigger more intimacy, which contradicts their attachment goal (for an overview, see Pietromonaco et al., 2004).

When interpreting our findings, one also has to keep in mind that attachment anxiety and avoidance were measured on continuous dimensions. They do not represent clinically relevant measures. However, we assume that significant effects may be even stronger for clinically relevant levels of attachment anxiety and avoidance. Moreover, the experimental setting allowed unstressed partners (in experimental condition 1 and 2) full potential to support their stressed partner. Unlike in everyday life, they were aware of the mock job interview and could infer why their partners might interact differently after being stressed. As Collins and Feeney (2004) pointed out, attachment is especially relevant in ambivalent situations, which may cultivate negative interpretations of partner behavior. Thus, effects of support providers' attachment anxiety and avoidance on their support behavior may be underestimated.

9. The role of attachment in dyadic interaction under stress (a simplified model)

9.1 Model description

In this section, I would like to suggest a new model to offer a framework for attachment and its consequences for relationship quality and partners' well-being (see Figure 8). The suggested model is influenced by many other existing models and theories (e.g., Bodenmann, 1995b; Bradbury & Fincham, 1990; Collins & Feeney, 2000; Cutrona et al., 2005; Reis & Patrick, 1996; Reis & Shaver, 1988). According to the model, the influence of partners' attachment is expected to affect stress appraisal, the behavior during dyadic interaction, and the evaluation of dyadic interaction. I start by presenting every variable of the model before I describe attachment specific effects for the dyadic model.

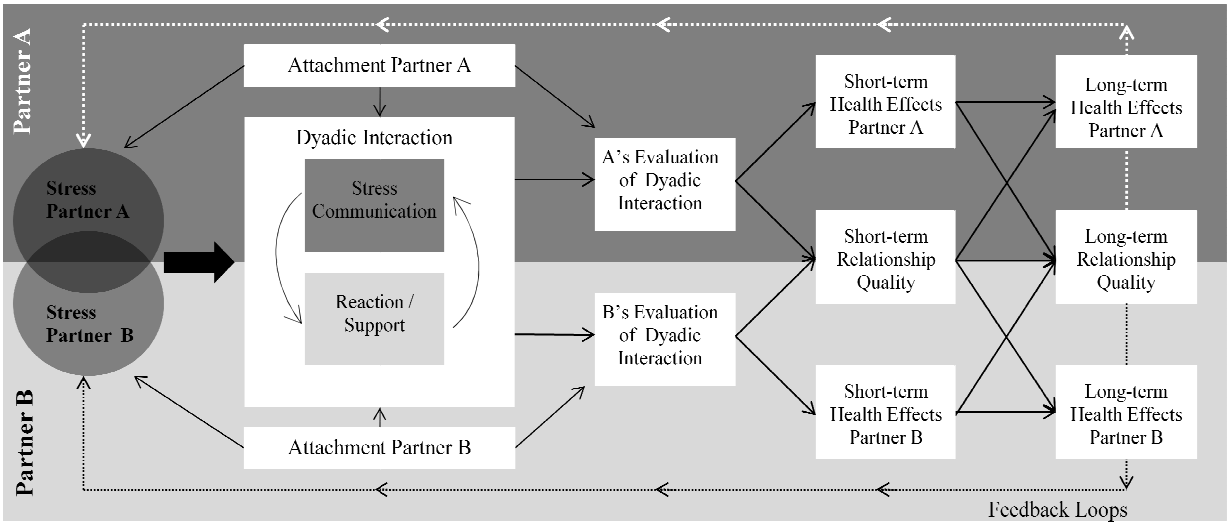

Figure 8: The role of attachment in dyadic interaction

a. Stress

As was discussed in the second chapter, stress is a dyadic phenomenon in the context of close relationships. Each partner of a dyad can either be affected by individual or dyadic

stress. Dyadic stress can either result from the shared environment of the couple, represented by the overlap of both partner's stress circle in the model (e.g., children, household tasks, opposed opinions), or result from a spillover effect of unresolved individual stress from one of the partners (e.g., high workload, conflict with a friend). The stress appraisal processes of each partner are interrelated according to Bodenmann's enlargement of Lazarus's Transactional Model of Stress (see Chapter 2.1).

b. Dyadic interaction under stress: partner's interpersonal behaviors

According to this model, experienced stress is supposed to trigger a dyadic coping process between partners[15]. Dyadic coping includes stress communication behavior from partner A and reaction and support from partner B (see Chapter 2.2). As the model should be applicable to all the coping efforts of a couple (as a result of extradyadic as well as intradyadic stress), this interpersonal variable is labeled as dyadic interaction. When interacting in the context of an intradyadic stress, both partners are in the role of communicating stress and reacting to partner's stress communication. Support can also be provided in conflict discussion, but it is less frequent as it is the partner who is the source of stress.

c. Evaluation of dyadic interaction

Each partner perceives dyadic interaction in his or her own individual way. All cognitions, attributions, and emotions regarding dyadic interaction are subsumed within this variable, labeled as evaluation of dyadic interaction. This variable is comparable to the evaluative process described in the Intimacy Process Model by Reis and collaborators (Reis & Patrick, 1996; Reis & Shaver, 1988), in which partner A evaluates whether he or she feels understood, validated, and cared for by partner B's response to his or her self-disclosure. Attributions

[15]This model does not include individual coping as it is concentrated on the dyadic perspective. Individual coping would, nonetheless, also be a possible and important reaction (see Chapter 2.3).

include casual explanations why a partner may behave in a particular way regarding the locus (internal vs. external), stability, and globality of a certain behavior, as well as explanations regarding the responsibility for it (Weiner, 1992). Functional attributions may result in an increase of perceived partner support (e.g., Cutrona et al., 2005; Fincham & Bradbury, 1990). In the context of an intradyadic stressor, we were also able to show that satisfaction (i.e., evaluation) with the distribution of housework was more important for relationship quality than the objective division of tasks (Meuwly, Wilhelm, Eicher, & Perrez, 2011).

d. Relationship quality (short- and long-term)

Relationship quality is represented in the model by a shared variable of both partners as it results from the interplay between both partners. Nonetheless, self-reported relationship satisfaction can differ between partners. As has been presented in Chapter 2.2, self-reported and observed positive couple interactions and support processes are related to improvements in relationship quality. Neff and Karney (2004, 2009) assumed that negative attributions are the underlying mechanism for the deleterious effect of stress on relationship satisfaction. When stressed, individuals reported more negative experiences as a possible result of negative attributions and heightened reactivity to daily negative relationship experiences. In addition, Bradbury and Fincham (1990) conclude in their review that attributions may influence marital satisfaction rather than vice versa.

e. Health effects (short- and long-term)

As presented in Chapter 2.4, relationship quality is associated with mental and physical health. The long-term effect on health is assumed to be mediated by short-term health effects and relationship quality improvements resulting from repeated successful dyadic interactions. A positive short-term health effect of a partner's support on cortisol stress recovery was found in Study 1. The model presented here also includes cross-over effects between short- and

long-term relationship quality and health (for a review, see Proulx et al., 2007; and Robles & Kiecolt-Glaser, 2003). However, a systematic examination of support provider's health effects, especially in the context of extradyadic stress, need to be clarified.

f. Feedback loops

The associations of the model presented here may include reciprocal effects. An individual's psychological, physical, and social well-being (health and relationship quality) may have stress buffering effects operating through positive feedback loops. Moreover, positive evaluations of the dyadic interaction may have positive effects on stress appraisal, since dyadic coping is an additional resource, and improvements in dyadic interaction. A negative evaluation of dyadic interaction, on the other hand, can offer explanations for the spillover effect of extradyadic to intradyadic stress (cf. Neff & Karney, 2004, 2009) and negative escalation in dyadic interaction, as well as the resulting martial dysfunction and negative health effects.

g. Attachment

Attachment has direct or indirect effects on any variable of the suggested model.

Stress appraisal of insecurely attached individuals seem to be increased (see Chapter 4.1), possibly resulting from a restricted functioning of attachment figures as a secure base. Moreover, according to Bodenmann's dyadic perspective of stress appraisal (see Chapter 2.1), attachment anxiety and avoidance may result in discrepant relationship-related goals, as attachment dimensions per se include specific relationship goals, such as avoiding rejection in the case of highly anxious individuals and avoiding intimacy in the case of highly avoidant

individuals. However, the specific influence of attachment depends on the specific match of each partner's attachment within a given dyad.

Dyadic interaction. The attachment system is activated in times of distress. The role of attachment anxiety and avoidance in seeking support (i.e., stress communication) and providing support was the topic of Study 2 (see Chapter 4.3). Especially within this variable of dyadic interaction, the interplay of each partner's attachment may become relevant. Different matches of partners' attachment may result in different dynamics of dyadic interactions. For instance, two secure partners may interact differently than a highly avoidant and a highly anxious partner (e.g., Creasey, 2002).

Evaluation of dyadic interaction. Both highly anxious and highly avoidant individuals are less satisfied with the support they receive (e.g., Bodenmann, 2000; Collins & Feeney, 2004; Davila & Bradbury, 2001). Gallo and Smith (2001) explicitly tested the impact of negative attributions in marital interaction on relationship satisfaction. In their study, effects for attachment anxiety were somewhat stronger than for attachment avoidance.

Associations between attachment and partner's well-being are also well established for *relationship quality* (e.g., Campbell et al., 2005; J. A. Feeney, 2002; Saavedra et al., 2010), on the one hand, and *health*, on the other hand. As an example for physical health, Picardi et al. (2007) found significant associations between attachment avoidance and immune parameters. An increase of depressive symptoms during the transition to parenthood were explained by negative perceptions of dyadic interactions (i.e., husband's anger and support) in highly anxious women in a study by Simpson, Rholes, Campbell, Tran, and Wilson (2003). In line with this finding, I assume that the effects of attachment on partner's psychological, physical, and social well-being are indirect by affecting evaluations of dyadic interactions, interpersonal behavior, and stress appraisal. As we have shown for highly anxious women in Study 1, the short-term health effect of partner support on cortisol recovery was reduced.

Naturally, such an effect may have consequences for long-term health. The model presented here also fits to the Biopsychosocial Model of Attachment for Disease by Maunder and Hunter (2001), combining the interplay between cognitions, physiological stress reactions, and the stress buffering effects of social support.

Further research is needed for attachment specific effects for support providers' well-being. Nonetheless, in an adult attachment relationship, partners are more symmetric and are interchangeably in the role of seeking and providing support. Overall, the long-term well-being of highly anxious individuals may be impaired by chronic monitoring of the relationship and that of highly avoidant individuals may be impaired by downplaying the relevance of the relationship. Securely attached partners may additionally profit from stress buffering effects in situations, where the partner is not available, resulting from positive internalized partner support (see Chapter 3).

9.2 Including depression in the model

Study 3 with depressed patients and partners can also be integrated in the model. The dependent variable of depression is a measure of psychological health. As presented in the article, expressed emotion is an indirect measure for negative interaction between partners. I suggest integrating dysfunctional attitudes as a part of a partner's evaluation of dyadic interaction into the model. The association between expressed emotion and depression was mediated by increased dysfunctional attitudes in depressed patients, but not in non-depressed partners.

Several studies with college students have shown evidence for the link between depression and attachment anxiety (see Altin & Terzi, 2010; Murphy & Bates, 1997; N. L. Williams & Riskind, 2004). However, the association for attachment avoidance is less clear (significant

association in Altin & Terzi, 2010; but no correlation in Murphy & Bates, 1997; and N. L. Williams & Riskind, 2004). In the study by Altin and Terzi (2010), the negative association between secure attachment and depression was mediated by increased relationship satisfaction, while preoccupied attachment was positively related to depression. This association between preoccupied attachment and depression was mediated by increased relational monitoring. In line with Simpson et al. (2003), this finding for highly anxious women matches the suggested meditational role of the evaluation of dyadic interaction perfectly. Roberts, Gotlib, and Kassel (1996) directly tested a mediation effect of dysfunctional attitudes for the association between attachment and depression. Attachment anxiety was positively related to dysfunctional attitudes, and comfort with closeness was negatively related. The indirect effect resulted in lower depression scores for secure individuals. A positive association between insecure attachment and dysfunctional attitudes was also found in a study by Andersson and Perris (2000).

The model presented here offers a framework for further research questions combining different areas of psychology, including clinical psychology. Insecure attachment is discussed as a vulnerability factor for depression (for a review, see Beatson & Taryan, 2003) as well as psychosis (for a review, see Berry, Barrowclough, & Wearden, 2007, which also discusses the underlying effect of social cognition).

9.3 Implications for couple interventions

According to Bowlby (1988), the client-therapist relationship offers a secure base for changes of a clients' attachment representations. In their review, Lopez and Brennan (2000) summarized the relation of hyperactivating and deactivating strategies (see Chapter 3.2) to psychopathology and described a healthy and effective self, characterized by optimal self-

organization and healthy engagement with others, as a therapy goal for the client in individual therapy. However, interventions with couples may be more complex.

According to Cutrona et al. (2005), increased trust is resulting from perceived partner support and can explain the improvements in relationship quality. For reason of simplification, I subsume trust as an individual component of relationship quality in the presented model. Trust can be described as the degree to which an individual feels secure in a relationship. Felt security is, according to Davila's suggestions (2003), the key point for the application of the attachment concept in couple interventions. Marital dysfunctions can indicate feelings of insecurity. In addition to conflict resolution and communication skills, Davila (2003) recommended improving support skills in order to increase felt security. The concept of Couples Coping Enhancement Training (CCET) and the Coping-Oriented Couple Therapy (COCT) by Bodenmann (2007, 2009; Bodenmann & Shantinath, 2004) matches her suggestions perfectly. Using coached dyadic interactions, couples are instructed to improve support skills (i.e., dyadic coping) in addition to conflict and problem solving skills. These interventions are all accompanied by theoretical inputs.

Bodenmann (2007, 2009) suggested the Three-phase-method to improve dyadic coping in order to undermine the spillover effect of extradyadic stress on couples' well-being. During the Three-phase-method, partners interact in a dyadic setting following classical speaker and listener rules. During all three phases, one partner (A) is the center of interest (the speaker), speaking about an extradyadic stress he or she recently experienced. The other partner (B) takes the role of the listener and support provider (the whole procedure is later repeated with switched roles). The first phase, the longest, is devoted to emotional stress exploration. Partner A starts with a short description of the stressful situation before he or she explores how he or she felt in the situation. According to the funnel technique, the goal is to dive down from superficial emotions to soft emotions, when possible explore personal constructs (also

described as schemas) and verbalize one's needs. In the second phase, the listener, partner B, provides support, concentrating especially on showing empathy and emotion-focused support. After support provision, partner A gives feedback to partner B (third phase) about how helpful the support was perceived to be and offering possibilities what else, according to her or his needs, would have been desirable during support provision. This feedback aims to improve coping skills directly so that both partners are responsible for adequate support provision. According to the different phases, the goal of the Three-phase-method is to improve partners' ability to express stress and, by understanding partner's needs, to provide adequate support (Bodenmann, 2007, 2009). This focus on interpersonal behavior is, according to the model presented in Figure 8, one way of influencing the impact of partners' attachment on couples' well-being by improving dyadic coping skills.

The Three-phase-method could additionally be expanded in order to improve the evaluation process of dyadic interaction. Especially for partners with insecure attachment, the evaluation process represents a critical variable to enhance relationship quality and health. Theoretical inputs highlighting the role of dysfunctional cognitions in perceiving dyadic interactions could sensibilize partners to its deleterious effects on relationship quality. However, to achieve changes in cognitions an additional intervention may be necessary. During the Three-phase-method, cognitions of the speaker regarding the stressor play an important role in helping to explore feelings and the personal construct during the first phase. The personal construct could per se include attachment goals. The first phase may help the support provider (listener) to understand the partner's needs. However, to detect dysfunctional cognitions in the evaluation of the interaction, it may be important to know how each partner evaluates the interaction. The therapist (or coach) could ask for cognitions during specific situations in the dyadic interaction. Two moments could be critical for the support provider, 1) at the end of the first phase, when the speaker communicates his deeper emotions and

needs, and 2) during the third phase, when the support provider receives feedback for support provision. Evaluations of the partner's communication and the related emotions may depend on the support provider's attachment goals (e.g., fear of not being able to accomplish the partner's needs). Verbalizing cognitions in these (and possibly other) particular situations could be realized, as a first step, by videotaping the interaction and subsequently asking for cognitions. Such a procedure would be comparable to the video recall procedure used in empathic accuracy research (e.g., Verhofstadt, Buysse, Ickes, Davis, & Devoldre, 2008). As soon as a couple has mastered the speaker and listener rules, the therapist could directly integrate this procedure in the coaching sessions. This possibility to verbalize cognitions is directly linked to the Three-phase-method.

Discussing recently experienced frustrating dyadic coping efforts (e.g., unsuccessful support seeking, inadequate support providing) in the dyadic setting might also allow the detection of the role of dysfunctional cognitions in couples' everyday life. During this interaction focusing on an intradyadic stressor, both partners take the role of the speaker consecutively. They thus have the possibility to verbalize their own view and emotions during a specific situation while the therapist ensures that both partners are following the communication rules and asks for specific cognitions and feelings. This second procedure may offer opportunities to detect dysfunctional cognitions in the evaluation process of dyadic interactions.

The procedures presented here may be especially important for highly anxious partners. As has been shown, especially attachment anxiety was related to dysfunctional monitoring of the relationship. However, the therapist needs to consider both partners' attachment characteristics. For highly avoidant partners, on the other hand, it may be more important to provoke habituation effects to intimacy and reduce the fear of dependence by repeated positive experiences in coached dyadic interactions (cf. Davila, 2003). Although the

attachment goal of highly avoidant individuals is to avoid intimacy, the need for attachment is universal. Therefore, for those partners it may be important to concentrate longer on the Three-phase-method, before looking at intradyadic topics and conflicts. For these individuals, the video recall procedure for detecting cognitions may initially represent an additional threat. It should only be applied when highly avoidant partners are successfully habituated to tolerating intimacy in the Three-phase-method. Therefore, the therapist has to be very sensitive to each partner's attachment characteristics and to the specific dynamic within a particular couple. Assessing each partner's attachment characteristics before starting the couple intervention may gain additional information and help to structure therapy sessions.

The suggestions for couple interventions based on the model presented in Figure 8 need to be tested and further concretized. Nonetheless, the attachment concept seems to offer a considerable potential for couple interventions. Improving felt security in relationships as a therapy goal for couple interventions may also offer possibilities for changes in attachment representations. As has been seen in Chapter 3.3, there is some room for change. According to Bowlby (1988), the therapist may offer a secure base for changes in attachment. It may be an ideal to create or improve a secure base within a given relationship during a couple intervention, and thus have a direct influence on an individual's most important social environment. However, there is still substantial research work to be done, both to concretize the attachment concept for couple interventions and to formulate practical guidelines for therapists working with a specific couple, including two individuals with particular attachment goals. An additional challenge may be to attract insecure partners to couple interventions.

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TABLES

FIGURES

Curriculum vitae Nathalie Meuwly

Born on June 22nd, 1981 in Fribourg, Switzerland

Academic Qualifications

since 2007 Research assistant to Prof. Dr. Guy Bodenmann at the University of Zurich (former at the University of Fribourg)

2005-2007 Undergraduate research assistant at the interdisciplinary Center for Family Research at the University of Fribourg (Prof. Dr. Guy Bodenmann)

2002-2007 Studies in Clinical Psychology, General Psychology and Economics at the University of Fribourg (master degree)

Clinical and practical experience

since 2010 Licensed coach for Couples Coping Enhancement Training (CCET/Paarlife)

2007 Clinical internship in the private psychiatry in Meiringen

2004-2006 Temporary work as an educator in a children's day-care center in Tafers

2001-2002 Educator in a home for adults with a mental disability in Erlenbach